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Molasses vs. Vinegar for City Officials

HIGHLY to be commended is the practice followed by citizens' clubs of a number of the larger cities of publishing periodicals dealing solely with civic affairs; and the call for such papers is indicated by the private publication of them in certain of such cities where they are not issued by the local municipal league or civic club. Such papers can have their greatest value, and their only real reason for existence, however, when they are absolutely non-partisan and impartial, or as nearly so as human nature can make them. It should also be their aim to improve civic conditions in all directions. This much all admit, and many live up to. But the methods employed by many of them we consider open to criticism.

It was the fashion many years ago to produce once a week from behind the kitchen door a "tickler" which saw service in an interview in the woodshed between the head of the family and his younger male offspring, on the theory that the latter had in all probability done something, known or unknown, to merit its application; with the result that its effect as a correction was *nil* when most richly deserved. Acting on this principle certain of these papers feel that it is their duty to assume that every man "in politics," or even holding a municipal office, has probably at the best done less than his duty, and so should be accorded only suspicion and discredit. As both the cause and the effect of this, citizens have come to feel that unless a paper assumes this attitude it is concealing some misdoings through friendship or less justifiable favor for the officials spared. Do not these same citizens know and practice in private life the advantages of suggestion? Commend a man for his upright bearing, and he will square his shoulders and endeavor to merit your praise; but call him a thief and treat him as such, and his moral vertebrae must be more than ordinarily rigid if he does not ultimately deserve the stigma. The great need of the day is for papers whose editors and managers are broad enough, impartial enough, and—most difficult of all—discerning and wise enough to ascribe where it is deserved both credit and blame to public officials and departments. We have learned that the best work in other fields is done, not under fear of the lash, but in the hope of praise, popularity or other forms of approval. It is also true that those establishments in which certain who are favorites can never be wrong, while others are never worthy of praise, cannot get the best results from their employees. Must it always be that we can retain as public employees only those whose epidermis is impervious to criticism, and who consequently cannot, on the other hand, be reached and inspired by the commendation of intelligent citizens?

SOUTH NORWALK MUNICIPAL ELECTRIC WORKS

Description of One of the Most Successful Municipal Plants in the Country—Both Street Light and Commercial Light and Power Furnished—Complete Financial Statement

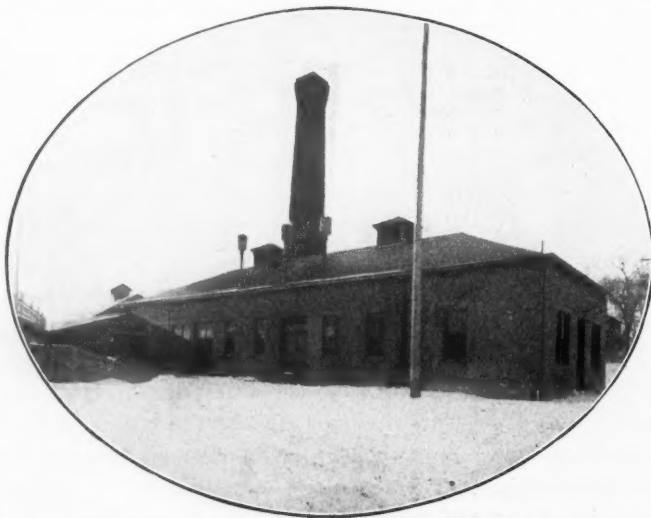
THERE have been printed any number of descriptions of electric plants either proposed or newly completed; and statements are made concerning many that they are or are not successful, but with a paucity of statistics to substantiate them. We are accordingly pleased to be able to furnish a description of a plant more than fourteen years old, which has been at all times considered to be successful, with the figures complete to the beginning of this year. For the information and the latest figures we are indebted to Mr. Albert E. Winchester, the General Superintendent, who was the Consulting Engineer for the original construction, and has had engineering charge of all extensions of the plant. It was probably in recognition of Mr. Winchester's successful work for this plant that he was appointed by the Civic Federation as a member of the committee of experts who were sent to England to investigate and report upon municipally owned enterprises in that country.

HISTORY OF THE PLANT.

As is often the case, dissatisfaction with the service rendered by the private plant resulted in a popular movement in 1891 looking to municipal street lighting; and the citizens voted to spend \$22,500 on a plant for this purpose, which was regularly placed in operation October 13, 1892. In the original installation were a horizontal tubular boiler, a 100 horsepower Ideal engine, two 60-light Western Electric arc dynamos, with feed-water heaters, etc. These supplied current to 86 series open arc lamps. All these were retired in 1903 in the process of enlargement after over eleven years of excellent service. In October, 1897, following an exhaustive investigation and report, \$20,000 was voted to establish a commercial addition to the plant, and commercial lighting has been furnished since August, 1898. Since 1898 the entire plant

has been run upon a commercial basis, fixed charges being established for all the output, both public and private, so that it might rely upon its own income for its maintenance. In 1900 \$17,500 more was appropriated to enlarge the plant to meet the growing demands upon it; in spite of which the generators were frequently overtaxed in 1901 and 1902. A committee of citizens in 1902 thoroughly investigated the plan and the affecting conditions, and upon the strength of this report \$5,000 was appropriated for meters and \$15,000 for further enlargement, which was completed in November, 1903. In spite of this the lighting and power business increased so rapidly that it was apparent by the end of 1904 that the fall load of 1905 would overtax the plant.

The problem this time was indeed a hard one to face. A further addition to the steam equipment was first thought of, but in view of space limitations and the uncertainty of coal prices, it appeared that the removal of the entire generating outfit to the city's property on the harbor front, so as to take advantage of a larger area, extensive coal storage capacity with direct boat delivery at minimum cost, and convenient condensing facilities, might be advisable. This expedient, however, involved such a large expense for moving and new buildings, in addition to the cost of increased equipment, that it was decided to seek an alternative if possible. As some attention had already been given to engines of the gas and fuel oil class, the subject was again up and this time, after a thorough investigation, it was determined that a modern high-class, large size gas or fuel oil engine installed in the present power house would afford the most efficient and inexpensive means of accomplishing the purpose in view. General Superintendent Winchester was thereupon directed to prepare the necessary specifications, plans and estimates to cover the proposed enlargement. On May 3, 1905, with all preliminaries complete, the Commissioners submitted a report to the Council advocating an enlargement at a cost of \$22,000, to be installed as early as possible. The Council endorsed the recommendation unanimously and called a city meeting on June 12th, to take authoritative action, at which the citizens voted for the enlargement and appropriated the amount of the estimate. Proposals for the complete equipment had already been received by the Commissioners in anticipation of the city's favorable action, and on June 17th they awarded the motive power installation to the American Diesel Engine Co., and the electrical outfit to the Fort Wayne Electric Works. All material for increasing and extending the distribution system was purchased by the Commissioners direct and the work entailed was per-



EXTERIOR OF SOUTH NORWALK GENERATING STATION

formed by the regular operating staff with temporary help. On the 15th of October, 1905, the new engine and generator unit was started under trial load with the final details of the installation to be completed later.

In the spring of 1905 arrangements were perfected between the N. Y., N. H. & H. Railroad Company, at the request and cost of the railroad company, for the establishment of a steam-heating system to heat the passenger coaches of waiting trains with steam from this plant, which was situated conveniently for the purpose, and this service has been performed since October, 1905.

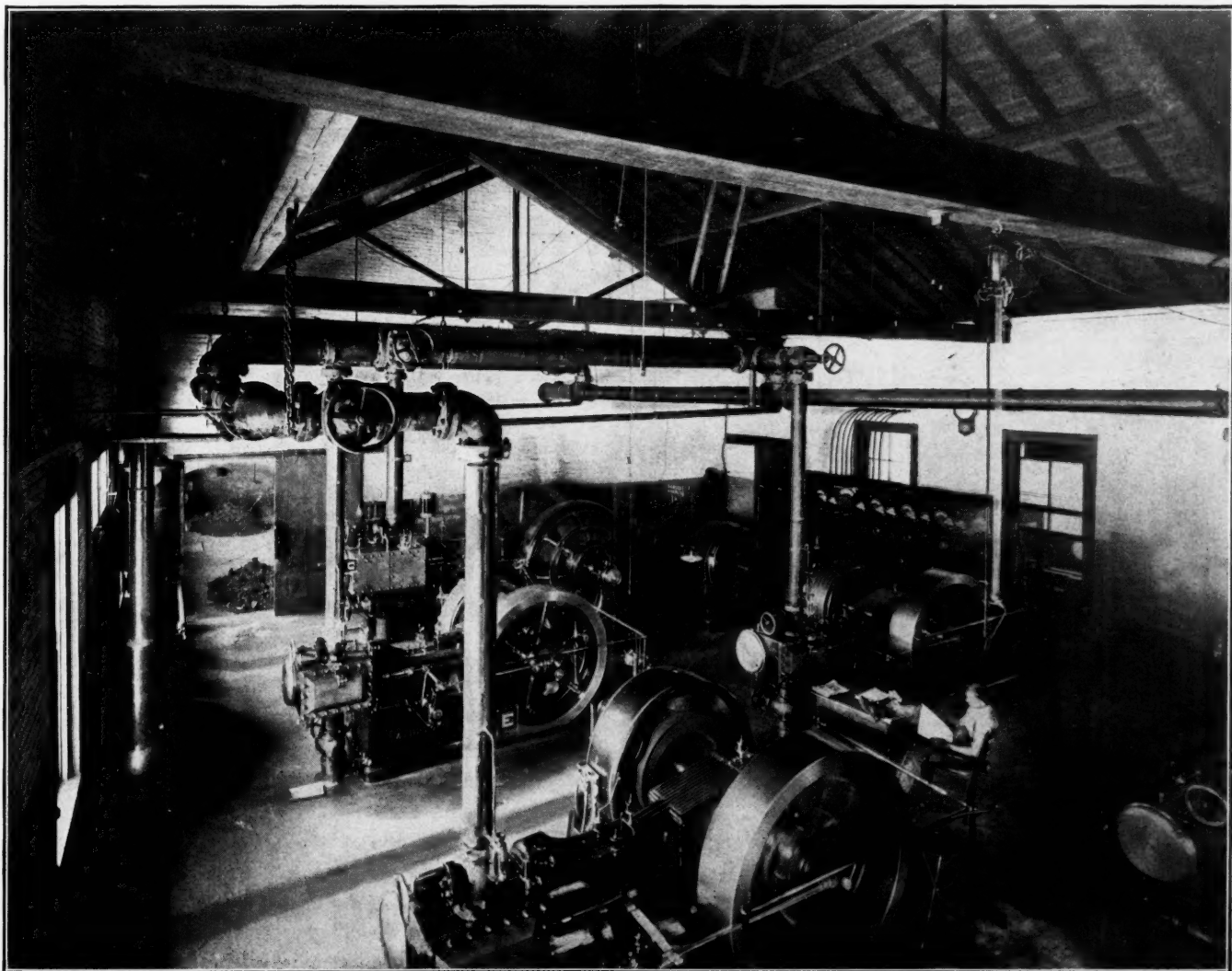
The Connecticut Lighting and Power Company had, meantime, through applications for injunctions and other legal proceedings, endeavored to prevent the city from supplying commercial lighting; but in 1901 all suits against the city's plant were withdrawn by the company.

DESCRIPTION OF THE PLANT

In spite of the successive enlargements, the station as it now stands is systematically arranged and presents no appearance of patch work. The building is of brick one and a half stories high with a cement floor. The main building measures 48 by 109 feet divided into engine and boiler room. The boiler equipment consists of four nominal 125 horsepower return tubular boilers, with a solid brick chimney 91 feet high furnishing a strong draft. In

the engine room, which is separated by a fire wall from the boiler room, are: four 100 horsepower Watertown high speed engines each direct connected to a 60 kw. generator; one 300 horsepower Watertown high speed engine, with Corliss economy, connected directly to a 165 kw. Fort Wayne generator; and a 225 brake horsepower Diesel fuel oil engine directly connected to a 160-kw. Fort Wayne generator. All these generators are of the multipolar 250 volt direct current class. There is also a No. 12 Brush arc generator connected direct to a General Electric 90 horsepower, 250 volt motor. Besides the engines and generators, a Norwalk air compressor forms a part of the Diesel engine equipment, which was the last unit to be installed. A marbleized slate switchboard is located on one side of the room, from which the whole output is controlled. Various pieces of auxiliary equipment are located in different parts of the room. One corner of the building is set apart for a good sized, pleasant office. The storage tank for fuel oil for the Diesel engine is placed underground in the driveway and has a capacity of 3,350 gallons.

From this building 16 circuits radiate: two are high tension arc mains, five low tension commercial feeders, three are feeder pressure wires, one is for local station lighting, one a switch wire to control clock and bridge lights, and four are circuits of the fire-alarm system.



GENERAL INTERIOR VIEW, SOUTH NORWALK GENERATING STATION

The operating staff at the present time consists of A. E. Winchester, General Superintendent and City Electrical Engineer; August C. Knorr, Clerk; William H. Mosher, Chief Engineer; also a second engineer, two firemen, a meterman, line foreman, lineman and trimmer.

FINANCIAL STATEMENTS

On January 1, 1907, the resources and liabilities were as follows:

RESOURCES	
Land and buildings.....	\$10,391.67
Motive power system.....	44,521.63
Electric generating system.....	19,904.31
Distributing system.....	35,429.85
Miscellaneous equipment.....	1,525.76
Legal expenses, rights, title.....	5,639.60
Supplies carried to 1906.....	370.41
Cash carried to 1906.....	25.06
1905 accounts receivable.....	4,792.06

Total, \$122,600.35

LIABILITIES	
1892 bonds, street light system.....	\$22,500.00
1898 bonds, commercial system.....	20,000.00
1900 notes, commercial enlargement.....	4,000.00
1903 notes, meter installation.....	4,000.00
1905 notes, commercial enlargement.....	4,000.00
1905 notes, commercial enlargement.....	19,000.00
Bills payable.....	1,194.51

Total debt	74,694.51
Surplus	47,905.84

Total, \$122,600.35

OPERATING EXPENSES	
Repairs	\$2,930.83
Interest	3,445.81
Salaries	7,715.97
Fuel	5,907.17
Material and supplies.....	3,316.69
Miscellaneous expenses	977.01

Total operating expenses.....	24,293.48
Gross gain or profit.....	14,783.55

Total, \$39,077.03

RECEIPTS	
Municipal lighting (streets and bridge) ..	\$6,640.80
Municipal department lighting.....	568.20
Commercial light	24,932.04
Commercial power	6,836.00
From loan to 1905 enlargement.....	99.99

Total, \$39,077.03

OPERATING RESOURCES	
Income for year.....	\$39,077.03
Cash carried over to 1906.....	308.49
1905 accounts collected.....	3,377.10

Total, \$42,762.62

DISBURSEMENTS	
Operating expenses (less bills payable)...	\$23,098.97
New construction account.....	2,845.55
Reduction of debt (notes taken up).....	12,000.00
Cash carried over to 1906.....	25.06
1905 accounts receivable.....	4,792.06
Due from fire-alarm appropriation.....	98.00

Total, \$42,762.62

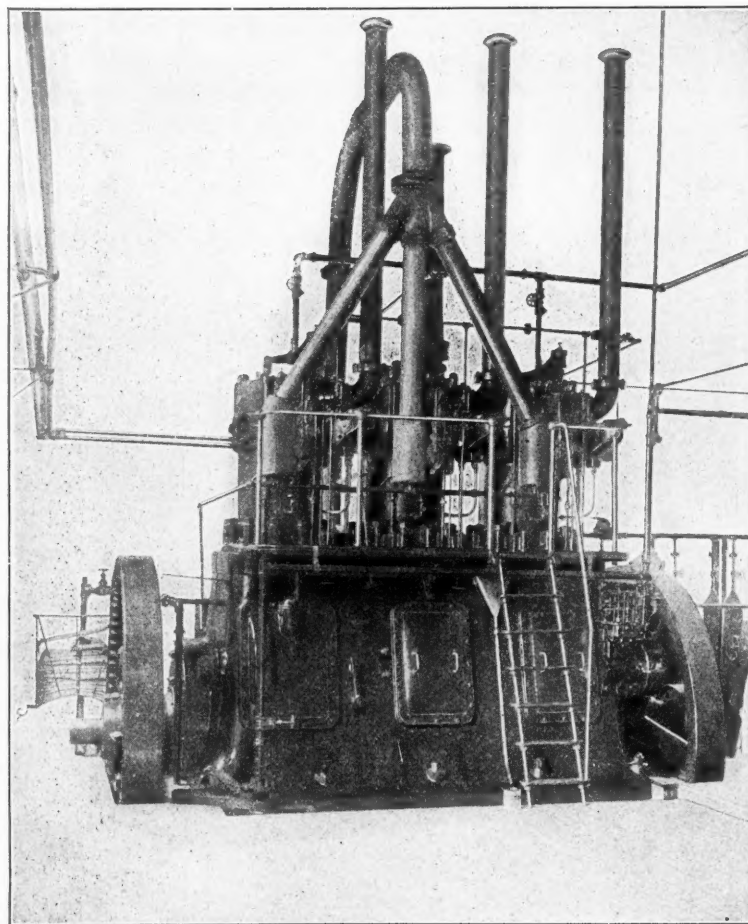
The street lights are constant direct current series enclosed arcs, nominal 1400 C. P., of which there were 109 in service at the beginning of the year and 110 at the end. These are placed at an average distance apart of 500 feet, and are fed by about 13 miles of wire in two circuits. They were lighted on an average of 357 nights during 1906 (a few moonlight nights were omitted) and burned 3,287 hours per lamp on the average. The average

cost per lamp per year is calculated to be \$60, and the average cost per watt hour about $5\frac{1}{2}$ cts.

The commercial lighting is by the parallel two-wire 220 volts direct-current system, delivered without intermission throughout the year. The nominal capacity is 8,800 16 C. P. lamps, but the equivalent of 8,865 are now connected.

The entire plant is rated as follows: boilers, 500 horsepower; engines 880 horsepower, kilowatt rating of generators 565. The kilowatt hours generated for the year were 872,372, of which 586,872 were by fuel oil and 285,510 by coal. The average income per kw. h. was 4.479 cents; average cost per kw. h. (including interest, repairs and operation) 2.764 cents; average cost by coal 3.59 cents, by fuel oil 2.25 cents. Steam was used as an auxiliary and to carry peak loads only, consequently the cost of coal per kw. h. appears high. Commercial light was served to about 460 consumers, and power to about 60.

In the above statement nothing is allowed for lost taxes,



DIESEL FUEL OIL ENGINE

but these are assumed to be balanced by fire service in connection with the fire-alarm system. Depreciation also is not mentioned. If we use the figures given on page 526 of the November 28 number of the MUNICIPAL JOURNAL, $3\frac{1}{2}$ per cent. interest, we obtain the value of this as about \$2,200. If we deduct this from the gross gain of \$14,783.55 we obtain a net gain of \$12,580, or $10\frac{3}{4}$ per cent. interest on the entire cost of the plant. The Commis-

sioners' estimate that, allowing for all items, including interest and depreciation, the cost of the street lights last year was \$6,540.00, which is \$1,526.00 less than they would have cost if paid for at the rate charged Norwalk by a private company, \$74 per lamp-year; (the average for the state is \$83.71); and that on the same basis the total saving since the starting of the plant has been \$21,478.09.

The mechanical plant is excellently maintained, and the interior of the station would please the eye of the most precise and neat mechanic. We have endeavored to give an idea of this in the illustrations; unfortunately the Diesel engine is so situated as to render a photograph impossible, but as this is thought to have been an important element in making possible the excellent showing for last year, we have substituted the photograph of an engine similar in practically all respects to this one, but in use in another plant. Two items are considered desirable by the Superintendent, and he hopes to obtain them during the coming year—a storage battery near the centre of the town to help carry the peak loads and for increasing the efficiency generally; and a meter-testing room, the plans which he has prepared for the latter providing for one of the most complete testing outfits in the country.

MUNICIPAL LIGHTING IN CLEVELAND

Gas Lamps Operated by the City for Three Years Past at Reduced Cost—Gas Purchased from Private Company

THE following information concerning the municipally-controlled lighting plant of Cleveland, O., has been furnished by Mr. W. J. Springborn, Director of the Board of Public Service. No allowance has been made in the figures for depreciation, but the addition to the cost given for the years 1904, '05 and '06 of an amount ample to provide for this would still seem to show that the cost of service is lower than that previously paid. An interesting point is the reduction in cost of lighting and extinguishing lamps by the employment of students for this purpose.

During the four years from 1900 to 1903, inclusive, all of the lamps in Cleveland were cared for by private contract. In the year 1904 the city undertook the care of all gas lamps, paying the gas companies 75 cents per thousand cubic feet for gas consumed. Since that time it has been caring for all of these, and also what vapor lamps are still in service. The electric arc lamps, however, it still contracts for. The price of the last in 1903 was \$75 per month; in 1906 a reduction had been made to \$69.22 per lamp. The largest reduction in cost, however, is directly traceable to the saving in cost of maintaining the gas and vapor lamps.

The city uses what is known as the Wellsbach incandescent burner of about 55 candlepower, for which it formerly paid the gas companies \$22 per year per lamp. Under municipal control they have cost as follows: 1904, \$12.56; 1905, \$13.44; 1906, \$13.17. During the last year

the division of cost was: For gas consumed, \$6.43; for maintenance, including every item of expense for supplies, extinguishing, lighting, etc., \$6.74; a total of \$13.17.

About 178 boys are employed to light and extinguish the lamps. These are paid \$18 per month, and about 90 per cent. of them are young men attending high schools or colleges. Many of them would not be able to go to school were it not for the money earned in this way.

The vapor lamps formerly cost the city \$23.85. Under municipal control the cost has been reduced to \$18.61 per lamp per year. The following table will show the total amount of money spent for street lighting and the cost per lamp per year, including the electric arc lights, which are still furnished under contract:

YEAR	TOTAL DISBURSEMENTS	TOTAL NUMBER OF OF LAMPS IN SERVICE	AVERAGE COST PER LAMP
1900	\$238,617.85	8,425	\$28.32
1901	259,227.90	9,163	28.29
1902	239,039.56	9,431	25.34
1903	271,648.35	9,631	28.20
1904	286,530.59	12,096	21.34
1905	266,208.10	12,830	18.39
1906	269,819.63	13,030	18.35

From the above it will be seen that there was a reduction of only twelve cents per lamp per year during the four years when the work was done under the contract plan, while there is a reduction of \$7.50 between the years 1903 and 1906. In addition to this saving on each lamp for the last three years, the city has also accumulated property consisting of lamps, supplies, equipment—such as horses, wagons, ladders and tools of all kinds—amounting to \$80,609.51, all of which was paid out of the disbursements above given, and by distributing this over the years 1904-05 and '06 it would amount to a still further reduction of \$2.35 per lamp. Thus municipal ownership has practically effected a saving of \$9.85 on each lamp during the period referred to.

It will also be noted that the number of lamps in service has been increased from 8,425 in 1900 to 13,030 in 1906, this being an increase of 55 per cent. The population of Cleveland in 1900 was 381,000, and in 1906 estimated at 465,000, which would be an increase of but 22 per cent., thus showing that the service under municipal control has not been retarded. The cost of maintaining lamps during the same period has been reduced 40½ per cent. The figures above given, however, do not include interest on the investment. This would, of course, make some slight difference.

Prices of Materials in January

DURING the past month flange steel plates have been selling in Chicago at 1.86½ to 1.96½ cents per pound; in New York at 1.94½ to 2.24½, and in Pittsburg at 1.80 to 1.90 cents. Cast iron pipe brought in Chicago \$37 to \$38 a ton for 4-inch, \$36 to \$37 for 6, 8, 10 and 12-inch, and \$35 to \$36 for larger sizes; in New York the medium sizes have been bringing \$34.50 to \$35, and in Birmingham 4-inch pipe is quoted at \$35, medium sizes at \$33, and over 12-inch at \$30. Pig lead sold in St. Louis at 6.10 to 6.15 cents per pound, and in New York at 6.30 cents.

THE GROWTH OF THE PUMPING STATION

Review of Progress Since 1878—Continual Advance Toward Higher Duty—Limit of This About Reached—Turbine Pumps and Engines—Gas Engines, Reheaters and Super-heating—Quadruple Expansion

By CHARLES A. HAGUE

Condensed from paper read before American Water Works Association

THE pumping station herein referred to is the regular waterworks pumping station devoted to municipal supply, and specimens of which may be found scattered broadcast over this great land, wherever a community has mustered sufficient courage and progressiveness to establish a system of waterworks requiring the placing of water under an artificial head or pressure.

The capacities of pumping engines and the dimensions of buildings to contain them have been on the general increase ever since 1878, a period from which dates the beginning of the wonderful development and rapid building of plant after plant for public supply, to say nothing of the enlargement and improvement of plants already existing in cities large and small.

Thirty years ago pumping engines of 2,000,000 to 5,000,000 gallons daily capacity were considered of quite some importance, and they were to the communities buying and using them. Occasionally a machine of greater capacity than these came into existence, going, perhaps, as in the case of Chicago and other large Western cities, as high as 10,000,000 gallons; Chicago early recognizing the fact that she must depend altogether upon pumping, and seeing the shadow cast forward by coming events, even going to the extent of installing pumping engines having a capacity as high as 30,000,000 or thereabouts. But these large machines were exceptional and only occasionally found; the great mass being of very much smaller dimensions, it even being thought in some very important quarters not many years ago that 10,000,000 gallons per twenty-four hours would eventually mark the top limit for capacity of the unit in pumping.

But nowadays the 10,000,000 gallon machine is left far behind in the march of improvement, and in the tremendous development of the country, until it has come to pass that 12,000,000 is considered moderate and reasonable; 15,000,000 common; 20,000,000 not unusual; and 25,000,000, 30,000,000, and even 40,000,000 not surprising. For special purposes, like sewage pumping, for example, anyone in the vicinity of Boston may investigate a 72,000,000 gallon pumping engine, if desiring to do so. In waterworks pumping it seems to be a question of unit in proportion to the gross demands, and it will pay anyone responsible for the quantity, cost, and quality of water for public supply to carefully consider the relations between the above-mentioned items. A good rough rule in a growing plant, occasionally enlarged, is to install each new engine of a capacity equal to the sum of the capacities of the engines already in place, until the new engine reaches the limit of the size of unit appropriate for the plant in question. For example, if a plant has been started with two 5,000,000 engines, when a

new one goes in, make it a 10,000,000 engine; or if started with one 5,000,000, and afterwards supplemented with a 10,000,000, after that put in a 15,000,000 engine. The rule must sometimes be modified by taking into account the average and the maximum pumpage, but the general idea is to keep the unit and multiple idea in mind so as to facilitate changing about, and using the reserves to the best advantage. Then by having an eye to the possible enlargement of buildings without entirely destroying the plant, so to speak, much lost time, trouble and money will be saved.

In the growth and development of the pumping station, refinement in machinery, and reduction in cost of manufacture, through better and more appropriate designing, coupled with more efficient and economical shop management, gradually led to higher and higher duties in steam economy, and this gradually changed designs and consequently sizes and forms of buildings. The old fight between low first cost and low duty, and high first cost and high duty, gradually quieted down by the great advocate of low duty and low interest accounts finally being forced to enter the field of a higher economy or retire to the background. He entered it and kept his colors well to the front for many years, but the simplification of the crank and flywheel engine and the increasing complication of the direct-acting engine from the very nature of the common aim of both towards high steam expansion has gradually placed them upon equal footing, so far as cost of construction is concerned, and there are undoubtedly certain items in the designing of the machinery like close clearance space, for example, in which the absolute control of the stroke by the crank gives that type of engine some slight advantage in everyday work. At all events the duty averaged from a fairly good number of engines gives the crank and flywheel machine an advantage which makes it necessary to push the direct-acting engine along in the market, where the other one gravitates without material assistance.

The higher steam pressures which go hand in hand with greater and greater steam economy, changed ideas on boilers, brought greater horsepower per boiler by enlarging the units and gross demands and lead to restricting the dimensions of the boiler plant so far as practicable. Probably for regular good every-day efficiency the horizontal return tubular is as good as any, and better than most. But where large powers are involved, the room required, and the size of the necessary buildings, place a limit upon the consistent size of boilers and units of this type. The writer takes the ground that under present circumstances of unit capacity, gross demands, economy of construction, convenience and economy of

operation, together with considerations as to buildings and space required, the water-tube boiler fitted with automatic stokers takes the lead as a general steam generator for waterworks pumping plants.

And, to make this complete, it should be supplemented with the further statement that the limits of steam economy in the pumping engine are about reached, both theoretically and practically. Not to go too far back the duty records have been, and are, as follows:

In the year 1893, 154,048,700 ft. lbs. per 1,000 lbs. steam; 1895, 157,843,000; 1898, 167,800,000; 1900, 168,532,800; 1900, 178,497,000; 1900, 179,419,600; and 1906, 181,068,605.

And finally the leading work has become crystallized into the vertical, triple-expansion machine, with outside packed plungers, and largely of the crank and flywheel type.

The relation between the difference in economical duties of pumping engines and the amount of boiler required (the measurable amount of boiler needed being positively indicated by taking ten square feet of heating surface for each boiler horsepower) is as follows: For a duty of 10,000,000 foot pounds per 1,000 pounds of steam the boiler horsepower per pump horsepower is 6.52; and is inversely as the duty, whatever that may be, being .326 for 200,000,000 foot pounds.

In considering the growth of the waterworks pumping station, it will be seen that the earlier practice was not free to plan extensively for the future, although it can be seen now that very much better work on this line could have been done than was actually accomplished. The main point is to look ahead, and calculate as nearly and as clearly as may be the probable growth of the city and its probable demands in the future for water pumpage. Of course it cannot be expected that actual and accurate prophecy need be indulged in; the principal thing is to think of the matter in some shape or other, and have an idea at least in view, that enlargements are bound to come, and increase in capacity is inevitable in the future.

It is scarcely possible that the cost of pumping stations for waterworks will be increased on account of a higher type of engine, because it is pretty evident that the top limit has been just about reached with the new record of a little over 181,000,000 foot pounds duty per 1,000 pounds of steam. Six years ago it nearly touched the 180,000,000 mark, and might have with some other refinement in the test; at any rate a gain of less than .6 of one per cent. in six years, with every nerve strained, is eloquent evidence of the top limit. The Mariotte curve is about the nearest approach to perfection in expressing the relation between the work done and the amount of steam used in doing it, apparently possible for the modern steam engine to accomplish; and, if the terminal pressure is taken as expressing the steam used and all of the steam is accounted for by the diagram, somewhere in the immediate neighborhood of 180,000,000 duty with 96 per cent. efficiency of the machine will be the resulting figure, with a reasonable amount of steam used in the jackets and reheaters charged up against the account. If

there were no necessity for the use of jacket steam the figure would approach 200,000,000 rather closely, and if superheating can save the jacket steam and vitalize the working steam the latter figure may in the near future be reached, so far as the report on high duty accomplished in a calculation is concerned; but if this pleasing result is obtained by a surface condenser with a consequently smaller air pump, although this type of condenser may require more maintenance account than the jet form, and if the superheated steam is obtained at the cost of coal; if these are so, then, what's the use?

If the steam turbine or the gas engine can step forward at this stage of the performance and the growth of the pumping station, and show something better in the matter of water sent up the hill in proportion to the coal bought and burned, this will, of course, effect a rather radical change in pumping stations, so far as the buildings are concerned at least; probably so far as present evidence goes, however, the changes will be in the line of smaller engine houses and larger boiler and coal houses. Whether the cost of construction of the machinery itself will be materially less than the present record holder, when all difficulties are overcome, and the new era machine is what it must be to stay, time only can tell.

Unless something very much out of the line of view at present develops in the near future the ideal turbine pumping engine will be a turbine steam engine driving a turbine pump, all mounted upon the same frame, as there is a loss in developing power from heat by a reciprocating engine, turning it into the electric mode of motion, and then again changing this into the hydraulic form represented by water under pressure, the latter conversion being through the medium of a turbine pump driven by electricity. No reciprocating steam engine can live under the speed required for turbine pumps under the ordinary water head demanded by the average waterworks, so that direct-connected reciprocating steam end and turbine water end are barred. The direct-connected turbine at both ends of the machine has been used on a small scale with doubtful economy, but nothing calculated for the average or large work has been attempted, and of course that is where the greatest benefit lies. When it costs for coal \$1,350 per year for each million gallons pumped per day, the total coal bill does not go very far into money for two or three millions of water per day, but when the quantity gets up towards say, 10,000,000 gallons per day, the figures are more important. The larger triple expansion engines, both direct-acting and crank engines, pump a million gallons of water per day with \$625 worth of coal per year for the best records, and \$900 is an ordinary good record, while about \$1,350 is the steam turbine pumping record, so far as the writer can learn, and he is very anxious to know the truth, so as to be in the front rank when the turbine bears the colors. It looks as though the great struggle to keep down the capital account in the turbine outfit must be at least partially abandoned, so far as pumping water is concerned at any rate. If a high-rim velocity is what the steam turbine needs, why not increase the diameter and reduce the rate

of revolution so as to meet the demands of the turbine pump? The pumping of water is the main thing in a pumping engine, not the accommodation of a new fad in an old idea.

The gas engine as a waterworks motor is, of course, entirely undeveloped upon anything like the scale which it will have to reach to be seriously considered in fairly large schemes of waterworks pumpage. There will be found to be a great variation in the gas production from different kinds of coal; likely as much of a variation as in the generation of steam from different fuels. And this is not only from the difference in the coal itself, but also from differences in gas-producing apparatus. But development on this line is going on, and good results in economical and reliable gas production, easy of manipulation, will no doubt be one of the improvements of the future not so very far away, probably claimed to be already accomplished by interested parties. At the World's Fair at St. Louis, in 1904, there was an exhibition of a gas-producing plant sending gas to a gas engine, which in turn was driving a large dynamo, and so a powerful electric current was produced with the burning of coal at one end of the system, with electric lights at the other end, just as we always see it, but with the boiler left out of the combination. This is a little hard on the boiler maker, but then he can make the gas tanks for the future, and at any rate just at present he need not worry about getting out of a job.

The large gas engines available for pumping for waterworks have not as yet come prominently to the front, and there are certain adaptabilities necessary to be made touching the matter of speed, for example, which complicates the problem more or less. There are many small pumping plants, of course, where the gas engine fits in very well, but there are some incidental items aside from actual fuel economy which have great weight proportionately in a small plant, but which would not be considered in a large pumping plant. The gas engine at its best can probably produce a horsepower with one pound of coal, but this imposes conditions not favorable to the economical pumping of water under pressure suitable for waterworks stations. The record of 1.02 pounds of coal per indicated horsepower hour is held in Boston by a pumping engine especially and completely adapted to the pumping of water upon a large scale. So you will perceive that the modern steam pumping station has already reached the apparent goal of possibilities in low coal consumption, quite as low as the gas engine can accomplish in actual service; the steam pumping station running generally from one pound per indicated horsepower on tests, to a range in actual every-day service from 1.33 to 1.98 pounds of coal consumed per indicated horsepower per hour.

A comparison between the two methods, one with steam and one with gas, shows that the steam pumping plant and the gas engine with gas producer are just about on an equal footing, so far as producing an indicated horsepower in proportion to the consumption of coal per hour is concerned; and this, of course, brings the matter

between the steam power plant and the gas power plant down to the question of investment of money in the plant itself, together with the current cost of operation and maintenance. The gas power plant has not made sufficient records yet to enable us to determine very much in the pumping line upon a considerable scale, but whatever it will do in the future, it is perfectly evident at present that the steam pumping station has just about reached its economical limits in the best plants, although as yet only a small percentage of the plants in existence are enjoying the fruits of the advanced practice. The present high type of pumping engine cannot be improved apparently to any material extent, so that the very best we can expect is an extremely small increase in economy by means of improved construction.

An increase in coal economy from 6 per cent. to 12 per cent. can most likely be gained by the use of superheated steam, although the interested and intelligent advocates of superheat will probably say that this is too low a figure for the gain. But it must not be forgotten that many of the good records for superheat have been made where engines of only fairly good economy are in use, whereas when the highest type of pumping engines are supplied with superheated steam, the application is then made to steam machinery of the very highest class, where multi-expansion, steam jackets, reheating, etc., are used to reduce the internal losses and condensation to an extremely low point. As already pointed out, very nearly the possible limits have been reached in utilizing the steam in modern pumping engines; the jacket system has been modified somewhat from early practice, and so brought to a high state of efficiency by keeping the heat in the jackets very closely to the balancing point, where the greatest good will be done with the least loss from useless radiation within the cylinder; the distribution of the steam is now very satisfactory and perfect, and the waste room or clearance is brought down to surprisingly low terms by the better arrangements of valve gear and steam ports.

If there is any waste heat in the smoke flues of the boilers of course re-heaters for the receiver steam can be provided, and this steam made a vehicle for the transportation of the heat now getting away up the chimney, back to the engine, and made to do work there. This is no special credit to any particular type of engine beyond presenting facilities for the use of such heat as the boilers are allowing to escape; but it will reduce the coal bills by turning into useful work some of the heat of combustion unabsorbed by the boiler heating surface. It is not entirely clear why more of this practice of flue reheating has not been done. It certainly has been long enough known. The writer has now before him a supplement of the *American Machinist* of October, 1878, illustrating the Pawtucket pumping engine designed and built by Geo. H. Corliss, in connection with which flue reheating was very successfully used, the duty given by a small cross compound engine reaching the very satisfactory figures of a little over 133,000,000 ft. lbs. with 100 lbs. of coal. Within the last five years the Barr Pump Com-

pany used this device at Haverhill, Mass., also in connection with a moderate-sized cross compound pumping engine, and the very best of authority reports over 150,000,000 ft. lbs. duty per 1,000 lbs. of steam, which at 9 lbs. evaporation, a fairly good figure for boiler work, would amount to 135,000,000 ft. lbs. per 100 lbs. of coal. The question plainly is, why in the growth of the pumping station has this sensible and easily applied auxiliary not been more utilized?

The quadruple expansion pumping engine with an additional steam cylinder, resulting either in a tandem arrangement for a portion of the engine, or an abandonment of the very desirable three plunger scheme, so favorable for steady hydraulic effects, has no great future before it; and even if it had, there is no good reason for making material changes in the station buildings, for it will of course be a vertical machine when the present-day units are considered, and will likely occupy no more floor space. But likely it will never come at all to any great extent, for, with the 33 to 40 expansions practicable with the triple machinery possessing such admirable mechanical lines, and with the conversion of heat into work about up to the limit, there is, in fact, no room for the quadruple expansion machine. The distribution of water into a force main from three plungers has never been surpassed, and likely as not never equaled, and in addition to that fact, and in the face of a good deal of talk, the triple engine holds the economy record far ahead of compound machinery.

By looking backward over the road traveled during the last twenty years of growth of the pumping station, it will be readily perceived that the demand has always been for a higher and higher class of pumping engine, and as the reduction of the fuel expense became more and more of an object and more and more clearly possible, and there was a better understanding of the whole subject, the engineers and the men who pay the bills were brought closer and closer together, until to-day it is surprising to see what a high type of machine has been produced for a price which in the past would have been considered simply ruinous to the builder. In the old days the competition was between machinery at a low cost, but consuming a considerable quantity of steam and coal; and machinery at a high cost consuming a comparatively small quantity of steam and coal. This, of course, brought the fuel and interest accounts into antagonism, and in many cases the most economical lines, all things considered, were worked out, the consideration of size and cost of buildings not infrequently coming into the controversy. The Worthington pumping engine, in 1878, fairly held the front line in the form of a direct-acting, non-rotative, compound condensing machine, and in many cases successfully disputed the field with the many odd and unrepeatable forms of the crank and flywheel pumping engine, forging at that time to the front, bearing the standard of a higher steam economy. For a good many years the direct-acting engine as an all-around better proposition held sway, and for durability and reliability as a machine for pumping water for public supply has

never been excelled. But gradually the financial end of the crank and flywheel manufacturing establishment and the engineering end drew closer and closer together; then the Worthington engine took on a high duty attachment and the competition went merrily on. The problem was to reduce the capital account by simplifying the design and keep on raising the duty; at least simplifying the design of the crank and flywheel engine, and a task very effectually done by Edwin Reynolds of the Edw. P. Allis Company. In other words, the problem was to maximize the efficiency, minimize the cost, and maintain the durability at the high level of the Worthington mark. The two former have been accomplished, but when we see one of the old-time direct-acting pumping engines plodding along after over a quarter of a century of hard work, and apparently in good health and spirits, we are not quite ready for a vote yet on the last of the three counts given above. Still the latest types of the crank and flywheel machine are doing very well, and the commercial points seem to be very well met in many cases, all things considered.

So far as the types are concerned, the growth of the pumping station has finally resulted in but three pronounced types of pumping machinery, the construction of which has been repeated enough times to make them really distinctive. These are as follows:

The Worthington High Duty Engine, both vertical and horizontal.

The Gaskill-Holly Engine, horizontal.

The Reynolds Vertical Three Plunger Engine.

Some cross-compound engines are built, but they can hardly be called a type, although in the horizontal form they make a very good engine. In the vertical form with the cranks at 180 degrees the engine does very well for reservoir work, but is extremely objectionable for anything like direct service, or where the consumers can feel the pulsations certain to be set up where the pumping column is cut off completely, twice at each revolution and without any blend of delivery of any sort. In the horizontal form the 90-degree crank engine is unobjectionable, and answers well even where consumers are involved; but the cross-compound vertical with 90-degree cranks should be shunned by all hands.

On direct service, with a system of closed pipes without storage, the cross compound would not be quite so good as the Gaskill-Holly engine, on account of the variations constantly taking place in the demands, and consequently speed and power, and although the reasons for this are perhaps of too technical a nature to be embodied in a general waterworks paper, belonging rather to papers dealing with engineering strictly, the writer will go far enough to say that any changes in power in the cross-compound engine vary the relation between the work done in the high- and low-pressure cylinders at opposite sides of the engine, and so destroy more or less the economy and regularity of the engine at work under a variable waterload, and a load which varies the speed as well as the power, quite contrary to the variations in the work of a mill engine, where the speed is practically

constant. With the Gaskill-Holly pumping engine each side of the machine is a complete compound engine, and whatever variation one feels the other feels as well, but without interfering with the relations between high- and low-pressure cylinders at opposite sides of the engine; each side taking and using steam and exhausting it into the condenser independently of the other side. The crankshaft simply keeps the pumps in proper relation to each other with reference to the water column, and this pumping engine in general design and under good construction is probably the best machine ever brought out for direct service and closed circuits of pipes without storage.

The Worthington Horizontal, High Duty, Compound Engine works well on direct service, but attempts to regulate it automatically have been little made; in fact, not much needed, as the compensating cylinders receiving their pressure practically direct from the waterload, although through the medium of an accumulator, respond very readily to changes of pressure and speed.

The Reynolds vertical three-plunger engine has not been much used in direct service, probably for the reason that this engine is generally used in large units, in systems too large to be really classed as of closed circuits, or mostly used in reservoir service. In an extensive system of pipes such as are used in the larger cities, even if there is no reservoir, as in Chicago, to pump into, there is a certain elasticity inherent in so many branches and outlets which furnish a constant relief and demand, quite the equivalent of a free delivery from the force main into a reservoir a long distance away from the machinery.

The growth and drift of the public pumping station seem to be towards larger and larger units, and the vertical triple expansion engine. Not only larger engines, but also towards smaller triple engines, and we begin to be accustomed to seeing 6,000,000, and even down to 5,000,000 triple vertical engines in operation. Just what the next ten years will bring out in the further growth of the pumping station cannot, of course, be definitely stated; it looks extremely doubtful for the dominance of the turbine type in that time, if at all, and the gas engine has not yet really made a good start for the front line. Superheated steam and generally higher steam pressure up to about 175 pounds will probably take place, gradually, and that will likely be the last firing line of the reciprocating triple expansion pumping engine. It will hold this line stubbornly, and it will require a great deal more progress than is evident in any direction at present to dislodge it or even shake it materially. Its capital and fuel accounts even with coal at a moderate price make a very satisfactory showing just now, and the maintenance in the presence of good design and construction will not exceed 2 per cent. in good-sized or moderate plants where it is reasonably cared for. Therefore it looks fairly safe to plan away for another generation at least, and look out for the future units during the remodeling of old plants or the construction of new ones, and the perfect plant, so far as present evidence goes, will involve the following items:

Water tube boilers, natural draught at least .8 of an inch of water, feed water economizers, damper regulators, coal bought on the basis of 14,000 heat units per pound, 175 lbs. steam pressure per gauge, moderately superheated steam by independent apparatus, modified steam jacketing and reheating, smoke flue reheating, vertical triple expansion pumping engines of long stroke, 200 feet per minute piston travel maximum, 20 revolutions per minute maximum, coal per indicated horsepower hour, 1 lb. for large plants, coal per indicated horsepower hour, 1.75 lbs. for small plants, maintenance of engines, 1.5 per cent. for large plants, 3 per cent. for small plants.

These and other items of similar nature are about what a look ahead discerns as the coming events in the planning, construction, and operation of pumping stations for public water supply.

Water Meters in Chicago

At the beginning of 1906 Chicago, Ill., had in use 10,559 meters, which was about 4.6 per cent. of the total number of services. Her meter rates were from 10 cents a 1,000 gallons for the first 165,000 per month to 4 cents for all in excess of 10,000,000 gallons in one month; 4,015 meters were repaired on the premises and 996 at the shops, while 6 were removed from service. Of the total number in use about 29 per cent. were on residence services, 15 per cent. on those to stores and flats, 17 per cent. to manufactories, 11 per cent. to business houses, 6 per cent. to railroads, and the rest scattering; 41 per cent. of the income was from metered services. During 1904-5 \$8,000 was appropriated by the city for a meter testing plant. On its completion an invitation was sent to all manufacturers of meters then in use in the city to be represented at a systematic test of all such meters, ten meters of each size and each make to be tested, where there were that many in service. Each company was represented, and each representative signed the report of the tests. It was concluded by the Superintendent that "for the conditions existing in the City of Chicago the disc type of meter is decidedly the best style and type to be used." Most of the meters tested had been in service from two to eight years, and the results would probably have been better if new meters had been tested. The majority of those actually tested were found to under-register—which is preferable to over-registering—the amount reaching as high as 40 per cent. in one case and 28 per cent. in another; most of them, however, did not exceed two or three per cent. The 5-8-inch meters tested were Pittsburg disc, National Meter Company's Crown rotary, Empire and Nash disc, Hersey rotary and disc, Thomson Meter Company's disc, Neptune Meter Company's Trident, and Worthington plunger and disc patterns. Chicago first began installing meters in 1862, when 65 were placed in service. By 1870 this had increased to 656; in 1875 there were 1,313 in use; in 1880, 2,113; in 1885, 2,897; in 1890, 3,925; in 1895, 5,120; and in 1900, 6,396.

DOUBLE FILTRATION OF WATER

Employed at Philadelphia, South Bethlehem, Lancaster and Kittanning, Pa.—Artificial Coke Schmutzdecke
—Effect of Light on Pure Water Reservoirs

Most engineers and experts are now convinced of the desirability of dividing sewage purification into two more or less distinct operations, the first of which removes the larger and much of the smaller suspended matter, leaving for the second the disposal of the colloidal matters and those in solution. In only a few instances, however, has dual filtration of water been advocated or employed; although preliminary treatment, sedimentation, is now commonly made to precede sand filtration; and the use of a coagulant to hasten and increase sedimentation has been proposed. Recently, however, several plants have been constructed employing double filtration, which are described briefly by P. A. Maignen in papers read before the American Association for the Advancement of Science and the Philadelphia Engineers' Club, from which the following is abstracted:

"A great improvement is now being introduced in municipal water plants. In Germany, France and England considerable thought is given to the process of double filtration. It has been put in practice in this country with the greatest success. Thus in Philadelphia a preliminary filter has been installed at Lower Roxborough three years ago, and another has just been contracted for as an addition to the slow sand filter plant of Belmont. The Lower Roxborough preliminary filter is composed of coke and sponge, through which the water passes on its way to the sand beds. This preliminary filter retains 60 per cent. of the mud and 80 per cent. of the bacteria, leaving 40 per cent. and 20 per cent. respectively of the work to be done by the sand filter. The results are:

"(1) Double the rate of filtration, six million gallons per acre per day, instead of three million gallons.

"(2) A better quality in turbidity and bacteria.

"(3) A considerable economy in the cost of operation and in the total cost.

"If the cost of installation of slow sand filters is \$30,000 per million gallons daily capacity, if the cost of operation is \$3 per million gallons, and if all the work is done by the plain slow sand filter, the total cost for each million gallons of water filtered will be \$7.10. But if 60 per cent. of the work is done by the preliminary filters, which cost \$6,000 per million gallons daily capacity and 75 cents per million gallons for operation, the total cost of the double system will be \$3.78 per million gallons of water filtered. For a plant dealing with a hundred million gallons daily, the yearly economy will amount to \$121,180, being the interest at 5 per cent. of a capital of \$2,423,600.

"This double system was established two years ago at South Bethlehem, Pa., and the typhoid fever has disappeared entirely. In the months of January, February, March and April, 1903 and 1904, there were at South

Bethlehem 178 cases and 54 deaths from typhoid fever. In the corresponding months which followed the installation of the filter plant (1905 and 1906) there were only six cases and three deaths from typhoid fever, and these were among people who drank of other than the filtered water. The bacillus coli was found in every sample of unfiltered water, and it was not found once in the filtered water." Samples were taken at the storage basin (between the river and the filter) at the filter outlet, and at a tap at Lehigh University, on ten different dates during January, March, April, May and June, 1906. The total number of colonies in water from the storage basin varied from 120 to 2,209; in water from the filter outlet it ranged from 0 to 15; and in that from the tap from 16 to 53. It is surmised that the increase between filter and tap is due to the fact that the filtered water stands for about two days in an open basin.

"The same double system was installed at Lancaster, Pa., in April, 1906. In the month of December, 1905, there were ninety cases of typhoid fever; in the corresponding month of 1906 there were only two cases." Bacterial analyses made upon thirty-five dates during April to September showed from 3,200 to 18,400 bacteria in the raw water of the Conestoga River and from 10 to 93 in the general effluent, with a percentage of removal of from 97.70 to 99.82; beginning six weeks from the time of first operation, when the filter was well tried out, there was but one sample which showed less than 99 per cent. reduction. The turbidity of the effluent after the same date was 0.0 in twelve samples, 0.5 in nine, and 1.0 in three.

The South Bethlehem plant consists of six units of scrubbers or preliminary filters, 16 feet wide, 38 feet long and 6 feet deep; and six units of final filters 16 feet wide, 152 feet long and 6 feet deep. The water from the storage basin enters the bottom of the scrubbers through 8-inch valves, rises through the filtering materials to within 6 or 8 inches of the top of the side division walls, and flows to the final filters, which are separated from the scrubbers by a dwarf wall only. When in normal operation the level of water on scrubbers and filters is the same, and there is practically no motion on the surface.



LANCASTER FILTER PLANT AND PURE WATER RESERVOIR

In the Lancaster plant there is no settling reservoir, but the river water is pumped directly from the river to the filters continuously, whether roily or not. But when roily, sulphate of alumina and soda carbonate as precipitants are added in a powdered form by an automatic contrivance; the water then passes into a circular tank 50 feet in diameter and 10 feet deep, with three concentric baffle-walls which help to effect thorough mixing; then through another tank of the same size with one baffle-wall, in which the suspended matter settles out; and finally into two other tanks of the same size, but containing coarse stone, coke and sponge in a series of layers at the bottom. The effluent from these goes to the filter system proper, which is composed of fifteen scrubbers, each 35 feet long, 16 feet wide and 6 feet deep, and fifteen final slow sand filters, each 140 feet long, 16 feet wide and 6 feet deep.

"In these installations the slow sand filters are made narrow and long. One reason for making these filter units small whilst the units in other modern filter plants are so very large (one acre), is that the author thinks the rate of filtration cannot be the same over the very large area on account of the resistance in the underdrains. That part of the bed which is nearest the outlet will filter faster at the beginning of the run than the more distant parts. The only reason given for these large units is economy in wall construction. This reason appears to the author very unsatisfactory, as the first consideration in work of this kind is efficiency, and not economy."

The materials used in the scrubbers, beginning at the bottom are: 1. A 9-inch layer of 3-inch pebble stones. 2. A 9-inch layer of coke, "stove" size. 3. A 24-inch space filled with four rows of slates placed at a slight angle upwardly, consecutive rows in opposite directions, so that the water is compelled to take a circuitous course in passing upward; the spaces between the slates being filled with coke, "nut" size. 4. An 18-inch layer of sponge, held down by cedar slats, stringers and I-beams. In the final filters the bottom 18 inches is filled with gravel, graded from 3 inches to 3-16 inch, on which rests 24 inches of filter sand.

An unusual feature of these plants is the method of

cleaning the sand filter beds and of washing the sand. At Bethlehem and Lancaster a crane travels on the division walls, a platform attached to the crane is lowered close to the sand layer. The men who scrape the dirty sand stand on the platform (instead of walking on the bed with sandals and wheelbarrows, as is done usually), they collect the sand on the platform, and the crane brings the load to a sand washer in which the sand is raised by a bucket elevator, it falls in water a height of about six feet, it is elevated again and falls into the water again three times, the last time it falls toward the platform perfectly clean and is conveyed back to the place on the bed whence it came. By this system the different particles of sand are not stratified according to their specific weight, nor are the finest particles washed away. The wash water enters the trough from the far end, which receives the clean sand, and goes out at the near end, which receives the dirty sand. Very little water is required, and that not under pressure; and the sand, being washed as soon as removed, is cleaned more easily and thoroughly than is the case in most plants where it is stored for days or weeks. Also no space is required for extensive sand bins and washers.

"The filters are covered by an ordinary house with plenty of light and air. Another feature of interest in these filter plants is the deposition of an artificial filtering membrane on the sand. This consists of very finely powdered coke mixed with the first water going in the filter. It fills the voids between the grains of sand and does in a few moments what takes several days with the natural mud. One of the advantages of this innovation is that the filters can be started at once at the full rate of six million gallons per acre per day, whilst with the old process the rate begins at 0.5 million gallons and is gradually increased to three millions in four or five days.

"Another record in favor of double filtration comes from Kittanning, Pa., where a double semi-rapid filter plant was erected upon the design of the author and placed in service on February 19, 1905. The following is the report of the Local Board of Health:

1904.....	103 cases	8 deaths
1905.....	25 cases	2 deaths
1906.....	8 cases	0 deaths

"In designing new filter works we should bear in mind that it is desirable to pump and filter the water as regularly as possible, day and night, and as the consumption varies from hour to hour, it is necessary to provide a reservoir for storing the filtered water. It has been held during the last few years that filtered water basins ought to be covered, because, it was said, the clear filtered water is more favorable to the growth of algæ than the unfiltered water.

"The author was asked at the International Engineering Congress of St. Louis, 1904, what experience he had had as to the behavior of filtered water in open reservoirs, and he had to acknowledge at the time that he had had none. But he has since made observations at South Bethlehem, Lancaster and Kittanning, Pa., which may prove of some interest.



LANCASTER FILTER PLANT IN USE—BEFORE BEING COVERED

"1st. The exposure of filtered water to the air in open reservoirs, providing no gross pollution such as would be created by drowned dogs or other animals, or by a considerable quantity of leaves, etc., is not objectionable. The air germs do not materially pollute the water.

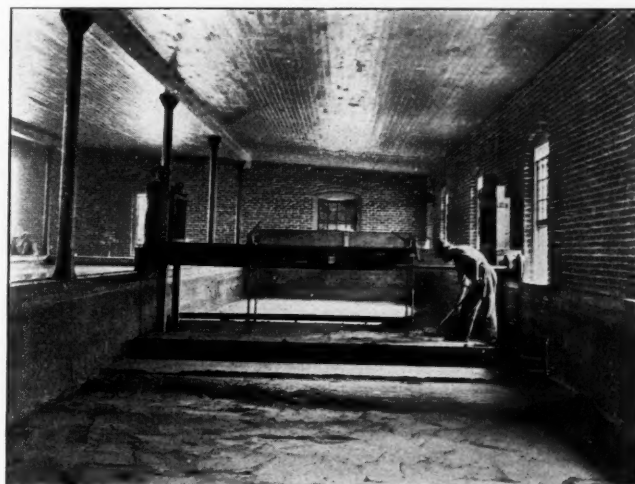
The raw water at Bethlehem contained an average of.....1,000 bacteria per c.c.
 The filtered water direct from the filters 5 bacteria per c.c.
 The filtered water in town (after having passed through the pure water basin, which holds two days' supply) 30 bacteria per c.c.

"Every sample of raw water tested contained the bacillus coli, not one sample drawn direct from the filter or from the spigot in town was ever found to contain the coli. The conclusion to be drawn from this observation, as far as the bacteria are concerned, is that it does not appear necessary to cover the filtered water basins. The money saved (in not covering them) should be spent in enlarging their dimensions, so as to avoid, as much as possible, the necessity of varying the rate of filtration.

"2nd. The inner walls of the South Bethlehem pure water basin are lined with rip-rap masonry. Algae were never known to have grown in that basin. The stones were black, owing to the proximity of the railway and the fall of soot from the locomotives. Last summer the superintendent of the filter plant, being desirous of showing off the beauty of the filtered water, white-washed the stones below the flow line. In a very short while, under the influence of the sun's rays, a beautiful crop of algae appeared on the white stones, and they gave trouble for some time. The stones became black again and the algae have disappeared.

"3rd. At Lancaster a somewhat analogous phenomenon occurred. Fourteen sand filters, not yet covered over with a roof, were placed in operation, at the same time and under the same conditions save one. Shortly afterwards a splendid crop of green algae grew in seven of

the beds. The other seven beds had no sign of algae. There was about 18 inches of water over the sand in all the filters. The only difference between the two sets of filters was that in those in which the algae grew, the sand was exposed directly to the fertilizing influence of the sun's rays. In the filters in which there was no growth a thin layer of very finely powdered coke had been deposited on the sand, and had made the surface black. No algae grew in these beds as long as the black filtering membrane was intact. But wherever it became broken up, voluntarily or accidentally, so that the black was removed and the sand exposed, the algae took root in the sand and grew like diminutive pine trees.



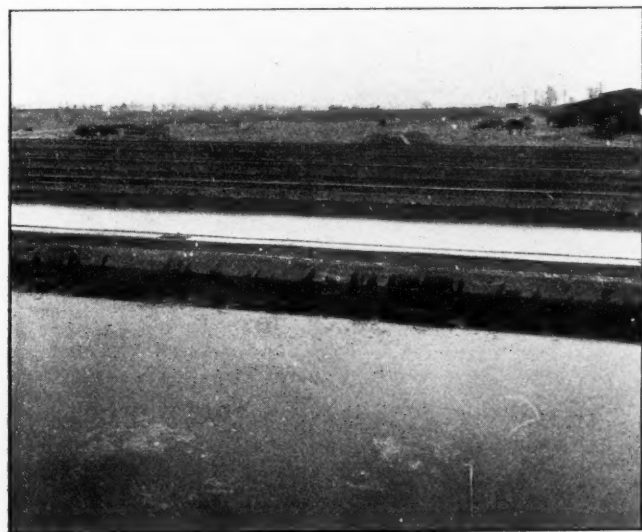
CRANE AND PLATFORM FOR CLEANING SAND BEDS AND CONVEYING SAND TO AND FROM SAND WASHER—SOUTH BETHLEHEM FILTER

"Can any scientist explain this phenomenon? It is reported that Benjamin Franklin placed a black cloth on a block of ice and the ice melted under the sun's rays. He put a white cloth on another block and the ice did not melt.

"Does the black color absorb and keep the light, and does the white color reflect it? Is the fertilizing influence of the sun's rays direct or indirect? Does the light bring a physical something from the sun which acts on the plants before reaching the earth, or does it draw out of the soil gases or other imponderable substances which are necessary for the development of vegetable life?"

Magnetite Lamps for Davenport

THE Committee on Public Lights of Davenport, Ia., reported to the Council a few days ago that as the result of a recent visit to several cities to inspect their street lighting systems, and of information supplied by their operating superintendents, they were satisfied of the superiority of the magnetite lamp over the other types. At St. Joe and Kansas City, Mo., they compared the 6.6 ampere series enclosed A. C. lamps with the new system of 4-ampere direct-current magnetite arc lamp, and at Jackson, Mich., they visited the first installation of magnetite lamps made in this country. They unanimously recommended the change of the Davenport system to the magnetic D. C. arc lamps, requiring 320 watts per lamp, operated from direct-current Brush arc machines.



LANCASTER FILTERS—ALGAE GROWTH IN NEAREST BED, NONE IN OTHERS

NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION

A Statement of the Specific Purposes for Which It Was Organized and its Success

THERE is meeting in St. Louis this week, in its second annual convention, the National Paving Brick Manufacturers' Association. While the general business of this association is of little interest to most of our readers, the extensive use of brick paving and the relation of this society to the same make a brief consideration of its aims a matter of interest to many cities. At our request Mr. W. P. Blair, President of the Association, has briefly outlined its purposes in the following statement: The National Paving Brick Manufacturers' Association was organized something over a year ago. The organization, however, was only made effective in the work for which it was organized during the year 1906. Prior to that little or nothing was done, except to perfect the organization; and while it covers now only a territory of something like seven States—Ohio, Indiana, Illinois, Michigan, Kentucky, Minnesota and Wisconsin—we have the promise of additional States coming into the organization at a very early date. Under the articles of organization four specific purposes are mentioned, namely:

- 1st. A dissemination among its membership of technical knowledge relating to the manufacture of their product.
- 2d. To bring to the attention of the public the merits of Vitrified Brick as a paving material.
- 3d. To influence to the greatest possible extent the proper construction of brick streets.
- 4th. For furnishing truthful and reliable information regarding other paving material, and their comparative value as pavements when considered with brick pavements.

By the terms of our constitution and by-laws we are required to hold our annual meetings at the same place and time as do the National Brick Makers and American Ceramic Society. The organization encourages membership in these in order to carry out this first stated object, since in these two societies technical questions are discussed openly and freely before the public.

The three other purposes involve a plan of campaign for advertising and promotion that is purely of a business character, and matters that are entirely devoid of interest to the general public, and merely relates to the best method of accomplishing the purposes named. The organization has perhaps expended its greatest energy in the matter of the third purpose, which is to influence to the greatest possible extent the proper construction of brick streets. The full and complete accomplishment of this will, we believe, necessarily result in extending the use, and establish with the public the merit of, vitrified brick as a paving material. It will likewise put into our hands truthful and reliable information with the strongest possible proof to be used for comparison of the great value of brick as a paving material when considered and compared with other paving material. That the work of the Association has been reasonably successful we fully believe. It is able to point with considerable pride to the

fact that in the seven States in which the campaign in favor of brick has been waged with considerable energy, more than 5,000,000 yards of that kind of pavement was laid in 1906. You can readily see that in this campaign while we are working for our own interest, incidentally we are conscious of serving the public to their decided advantage, and this we say without having in mind any allusion whatever to our competitors in street paving material. The work of the Association commends itself to the public in this way—that wherever a brick street is chosen in preference to other material, the class of construction that we are enabled to secure by our campaign is greatly appreciated by the public in choosing a brick street, and they are now getting a better one than ever before. We believe, too, that the Association is supplementing the efforts of the various civic league societies throughout the country, both from an economic and artistic standpoint. The Association has accomplished much during the past, but we realize that its work has only commenced and that a field of labor is opened up to us that means much labor and persistent effort.

To Facilitate Municipal Utilities

By a recently amended act of the General Assembly of the State of Vermont, "obligations created for a water supply, sewers or electric lights shall not be taken into account" in the determination of the permitted indebtedness of a municipality. Somewhat similar actions have been taken in several States, and are being considered in others for facilitating the construction of municipal utilities from which an income is expected to be derived. Thus in Minnesota, cities of 10,000 population or less may issue bonds for waterworks and electric light plants to the extent of 7 per cent. of the assessed valuation, and between 10,000 and 20,000 up to 5 per cent. for waterworks alone. In Kansas, cities may issue bonds up to 15 per cent. of the assessed valuation for natural gas, water, electric lighting and heating plants. And in Oklahoma up to 4 per cent. may be issued for electric light plants. In Missouri, municipal waterworks may be paid for by bonds secured simply by a mortgage on the plant, involving no general liability of the city; the works, with a thirty-year franchise, to be turned over to the bondholders in case of default. Somewhat similar laws regarding street railways were passed in Illinois in 1903.

Oiled Roads in Kentucky

IN Fayette County, Ky., more than one hundred miles of roads are said to have been treated with asphalt-base oil. "Macadam roads built five and six years ago are smoother and harder to-day than when first completed, and not a penny has been spent on the roadways for repair. The County Judge states that the average cost per year per mile for repairs of the Tate Creek Pike had been \$15, and that all of this money had been expended in keeping the drains open and clean. Not a pound of metal had been added in four years. An application of oil when the road was completed and one thereafter had produced this result."

A YEAR'S WORK IN NEW YORK CITY

General Statement of Amounts of Work Done by Various Departments—Total Greater Than Construction of Panama Canal

THERE is no question that the amount of work done in Greater New York during 1906 far exceeded in cost that conducted on any other equal area in the world. Even the Panama canal is far outdistanced. Most of this is directly or indirectly controlled by the engineers connected with the various city or borough departments, and which number nearly one thousand, about one-half of which have organized themselves into a society—The Municipal Engineers of the City of New York. In his annual address on January 23d the President of this society, Geo. W. Tillson, gave a brief review of the work done in the city during the previous year, from which the following data are taken.

In subway work the Manhattan-Bronx subway has been extended and 22 miles are now in operation, carrying as high as 600,000 passengers a day. The North Brooklyn tube headings met December 17, and the two tunnels are expected to be in operation in April. Surveys were made for 165 miles of new routes, to cost \$300,000,000, and contracts have been authorized for two—the Lexington avenue route and the Seventh, Eighth and Jerome avenue route. A route to start from Pelham Bay Park and reach Coney Island via Brooklyn also is ready for contract.

The Dock Department has built about 1,000 feet of bulkhead wall, twenty new piers, a three-story steel and concrete market building, a bulkhead wall and marginal street about one mile long. The nine piers on the North river represent the highest type of pier building ever attempted in this country. Two ferry terminals have been completed, and two started.

Abolishing grade crossings in Brooklyn has involved building 7,500 lineal feet of concrete retaining wall, besides fifteen bridge abutments and 16,000 cubic yards of other masonry and 850,000 cubic yards of earth work. Improvements have been made in the transit facilities on the Brooklyn and Williamsburg bridges, and construction work has been prosecuted on the Manhattan and Blackwell's Island bridges, 13,500 tons of steel having been put in place on the latter. Seven other bridges have been wholly or partly completed.

In connection with the water supply, the new Croton dam and west basin of the Jerome Park reservoir have been completed; considerable work has been done on the Cross River dam, and a start made on the Croton Falls reservoir. There have been constructed several driven-well stations, a 72-inch steel force main, thirty-six miles of distribution mains, 1,100 hydrants, 1,500 gates, and sixteen miles of high-pressure fire mains, the whole costing about \$2,000,000.

The Board of Water Supply has located sites for three reservoirs and the aqueduct line of the proposed new supply, the former involving topographical surveys of

16,000 acres, and land surveys of all included property for condemnation purposes; of the aqueduct, 86 miles long, about 40 per cent. has been located and 15 per cent. prepared for contract, this involving 550 miles of surveys and 12 miles of sub-surface borings.

The following amounts of paving have been laid (in lineal miles):

Borough.	Sheet Asphalt.	Block Asphalt.	Granite block.	Medina block.	Wood block.	Macadam.	Iron slag.	Brick.	Total.
Manhattan	3.08	6.03	2.09	...	1.93	...	...	...	13.13
Brooklyn	36.41	4.70	4.43	1.72	...	0.94	0.26	...	48.46
Bronx	1.49	3.02	0.20	0.28	0.13	...	...	...	5.12
Queens	0.42	1.20	...	...	...	3.27	...	0.82	5.71
Richmond	...	2.51	0.54	...	...	...	0.25	...	3.30
	41.40	17.46	7.26	2.00	2.06	4.21	0.51	0.82	75.72

The miles of sewers constructed were as follows: Manhattan, 1.74 miles; Brooklyn, 20.00 miles; Bronx, 11.10 miles; Queens, 6.50 miles; Richmond, 0.78 miles. Total, 40.12 miles.

Land for a new public market in Brooklyn is being cleared at a cost of \$200,000, on which a \$2,000,000 building is to be erected. In Manhattan a public bath, to cost \$250,000, is under construction, and money has been appropriated for four others, these to be three stories high and contain gymnasiums, play grounds and roof gardens.

In addition to the above the Board of Estimate and Apportionment authorized assessable improvements estimated to cost as follows: Manhattan, \$1,028,700; Brooklyn, \$2,633,150; Bronx, \$3,754,600; Queens, \$1,383,150; Richmond, \$1,000,300; a total of \$9,799,900.

Copper Sulphate Treatment in England

DURING the past two years reams of pages have been written concerning the copper sulphate treatment of algæ-afflicted reservoirs; but comparatively few foreign reservoirs have been treated. It is, therefore, interesting to learn the detailed experience of the use of this algicide in England. J. Howard Jones, Medical Health Officer of Newport, in his annual report for 1905, describing the experiences of that borough, states that they had annually been troubled by a fishy smell in the water. There are four reservoirs, and a test of the treatment was made in one of these of 81,000,000 gallons capacity, and 36 feet maximum depth. The effort was made to produce a uniform solution of one in a million of cubic sulphate, which required 810 pounds for this reservoir. The common method was adopted of dragging bags of copper sulphate through the water, and every care was taken to cover the whole surface of the reservoir by systematic navigation. Within half an hour of treatment a large quantity of small white flacculent coagulum formed and gradually sank; and within twenty-four hours there was a marked improvement in appearance. In a few days the water was more brilliantly clear than it had ever been before. The other reservoirs, one 70 feet deep at the center, were treated with similar success, one result being that the deposit on the outlet screens was less in three weeks than it had been in three days in previous years. Four days after treatment but one part of copper to 734 million gallons was found in the upper layers of one reservoir.

THE DISPOSAL OF MUNICIPAL WASTE

Systems and Methods, with Special Reference to American Conditions—List of Government, Institutional and Business Garbage Crematories in Chronological Order

By W. F. MORSE, Sanitary Engineer

This Series of articles, begun in the February number, will be continued until completed, and will be illustrated by original drawings, cuts, diagrams and pictures, and contain many tables valuable for reference.

TABLE XXXIII.—LIST OF GARBAGE CREMATORIES INSTALLED FOR THE U. S. GOVERNMENT SINCE 1885

No.	Year	No.	Builders	Location	Capacity, Tons	Cost	House or Building Incl'd	Remarks
1	1885	1	Lt. H. I. Reilly. U. S. A....	Governors Island, N. Y. Harbor.....	.....	\$300	No.....	Discontinued 1904; see Table XXXII.
2	1891	1	Engle, San. & Crema'y Co..	McPherson Barracks, Atlanta, Ga.....	5	3,000	Yes.....	Operating 1907.
3	1895	1	Engle, San. & Crema'y Co..	U. S. Navy Yard, Brooklyn.....	10	4,500	Yes.....	Discont'd 1905; site occupied by Dry D'k
4	1898	1	Dixon Crematory Co.....	Santiago de Cuba.....	3	2,400	No.....	For U. S. Mil'ry Hospital—discontinued.
5	1899	1	Dixon Crematory Co.....	U. S. Mil. Acad'y, W. Point, N. Y..	5	1,390	No.....	Operating 1907.
6	1900	1	Dixon Crematory Co.....	Ft. Warren, Boston Harbor.....	5	1,200	No.....	Operating 1907.
7	1901	1	Dixon Crematory Co.....	Ft. Russell, Cheyenne, Wyo.....	5	1,590	No.....	Discont'd; too small for required service.
8	1901	1	Dixon Crematory Co.....	U. S. Navy Yard, Portsmouth, Va.....	8	4,344	Yes.....	Operating 1907.
9	1902	1	Morse and Boulger Co.....	U. S. Navy Yard, League Is'd, Phila....	10	7,723	Yes.....	Operating 1907
10	1902	1	Dixon Crematory Co.....	U. S. Hospital, Hot Springs, Ark.....	5	1,869	No.....	Operating 1907. See Table XXXII.
11	1902	1	Dixon Crematory Co.....	U. S. Army Post, San Juan, P. I.....	5	3,985	No.....	Operating 1907.
12	1902	1	Morse & Boulger Co.....	U. S. Emigrant Station, N. Y.....	10	5,280	Yes.....	Operating 1907.
13	1902	1	Municipal Eng. Co.....	Ft. Riley, Kansas.....	5	.....	Yes.....	Operating 1907
14	1902	1	Municipal Eng. Co.....	Ft. Leavenworth, Kansas.....	10	.....	.....	Operating 1907.
15	1902	1	Dixon Crematory Co.....	Presidio, San Francisco, Cal.....	5	.....	No.....	Operating 1907.
16	1903	1	Municipal Eng. Co.....	Ft. Brady, Mich.....	5	3,000	Yes.....	Operating 1907.
17	1903	1	Morse-Boulger Co.....	U. S. Naval Station, San Juan, P. I.....	3	700	No.....	Not including erection.
18	1903	1	Morse-Boulger Co.....	Culebra, Panama Canal Zone.....	5	1,050	No.....	Not including erection.
19	1903	1	Municipal Eng. Co.....	Fort Getty, S. C.....	8	2,975	Yes.....	Operating 1907.
20	1903	1	Municipal Eng. Co.....	Fort Meyer, Arlington, Va.....	.....	.....	.....	Operating 1907.
21	1903	1	Municipal Eng. Co.....	Ft. Slocum, N. Y. Harbor.....	.....	.....	Yes.....	Operating 1907.
22	1904	1	Municipal Eng. Co.....	Governors Island, N. Y. Harbor.....	.....	.....	Yes.....	Operating 1907
23	1904	1	Morse-Boulger Co.....	Fort Banks, Boston Harbor.....	5	2,740	Yes.....	Operating 1907
24	1904	1	Morse-Boulger Co.....	Ft. Russell, Cheyenne, Wyo.....	12	8,200	Yes.....	Operating 1907.
25	1904	1	Sanitary Eng. Co.....	Ft. Sam Houston, S. Antonio, Texas....	10	4,925	Yes.....	Operating 1907.
26	1904	1	Sanitary Eng. Co.....	Ft. McKinley, Portland, Me.....	5	4,000	Yes.....	Operating 1907.
27	1905	1	Lewis & Kitchen.....	Obispo, Panama Canal Zone.....	5	1,791	No.....	Operating 1907.
28	1905	1	Morse-Boulger Co.....	U. S. Navy Yard, Brooklyn.....	10	3,000	Yes.....	Operating 1907.
29	1905	1	Sanitary Eng. Co.....	Ft. Barrancas, Pensacola, Fla.....	8	4,220	Yes.....	Operating 1907.
30	1905	1	Morse-Boulger Co.....	Ft. Logan, Colorado.....	5	.....	Yes.....	Operating 1907.
31	1906	1	Lewis & Kitchen.....	Ft. Ontario, Oswego, N. Y.....	6	3,586	Yes.....	Under construction.
32	1906	1	Dixon Crematory Co.....	Ft. Des Moines, Ia.....	6	4,500	No.....	Under contract
33	1906	1	Lewis & Kitchen.....	Ft. Dupont, Delaware City.....	6	3,300	Yes.....	Under contract.

The Garbage Furnaces Installed for the United States Government Since 1885

THE first employment of Government furnaces devoted exclusively to the disposal of offensive matter seems to have been in the garrisons of the British Army. An American physician, Dr. Kilvington, while Health Commissioner of Minneapolis, in a paper read before the American Public Health Association at Milwaukee in 1888, described a garbage furnace seen by him at Gibraltar in 1865, devoted exclusively to the destruction of waste matters. This was the simplest form of a brick oven floored with fire-bars, having an ash pit beneath, and connected to a short brick chimney, the refuse being charged through the doors in front. This was perhaps the first instance of the "hand-shovel-fed" destructor of the British type, which has since followed this same method of charging.

The American Army posts found the same need of

sanitary disposal of waste matters, and in 1885 the first American garbage furnace was built at Governor's Island, New York Harbor, by Lieut. H. I. Reilly, as described and illustrated in the October, 1906, number of this journal.

This furnace, known as the "Government Garbage Crematory," was installed at many stations of the Army, but has now been abandoned at nearly all, the surviving examples being at Ft. Sheridan, near Chicago, Forts Wadsworth and Totten, New York Harbor, and at one or two of the smaller Army Depots.

The first departure from the Government type was made by Capt. W. Jacobs, then A. A. Q. M., U. S. A., at McPherson Barracks, Atlanta, Ga., who caused to be built in 1892 an Engle Garbage Cremator of a special design, under the superintendence of the writer. In this cremator (which was the distinctive term given to all the early Engle constructions) a radical change in

form of construction from the original Engle patents was made, which was afterwards secured by new patents and became the regular type of Engle furnace. This first Government Cremator at Atlanta is still in use, and in the fifteen years of its service has required less than \$50 for repairs.

The First Furnace for Navy Yards.—The first cremator for our Naval service was also an Engle, built at the Brooklyn Navy Yard in 1895, from the designs of the writer. It was removed in 1904, as the site was included in the new dry dock location, and was replaced in 1905 by a destructor of the Morse-Boulger type.

These furnaces were followed by others at the various army posts and naval stations, and are now becoming a recognized part of the equipment for the disposal of waste at all the Governmental stations, including the military camps and equipment depots of the Panama Canal Zone. Constructions are now pending at the Naval station, Cavite, Philippine Islands, and the Navy Yard, Pensacola, Fla.

The Builders of Government Furnaces.—These furnaces have been built by four companies, under different patents, but all follow in their main features the

original form of the American furnace construction.

The Engle Company's patents Nos. 372,394, A. Engle, 1887, and 486,851-2-G. H. Warner, 1892, were followed by the Dixon Company, Nos. 517,816, by S. W. Dixon, 1891, and 724,898, E. J. Little, 1903, and those by the Morse-Boulger patents Nos. 537,181, B. Boulger, 1895, and 773,920, 1904. The Municipal Engineering Company, the Sanitary Engineering Company, and Messrs. Lewis & Kitchen all operate under the same patents, Nos. 783,473-5-7, and 800,177, F. P. Smith.

The Construction and Capacity of Furnaces.—Up to 1902 the design of house and furnace and the estimated capacity was left to the judgment of the builders when submitting proposals, but at League Island (Phila., 1902) the Government specifications first defined the required combustion per square foot of grate, and the specified quantity of fuel to be burned per ton destroyed. The present specifications are usually for the destruction of eight to twelve tons of garbage, containing the average quantity of moisture (65 to 72 per cent.) in a period of ten to twelve hours with the consumption of a guaranteed amount of coal per ton of waste consumed. This is practically one-half the actual capacity of the furnace, the maximum being only reached when naval stations are crowded

TABLE XXXIV—LIST OF GARBAGE FURNACES AT PUBLIC AND PRIVATE INSTITUTIONS, ETC., SINCE 1885

Year	Builders	Hospitals and Sanatoria	Public Institutions, Colleges, Medical Schools, Laboratories, etc.	Hotels and Business establishments
1886	Dr. I. S. Billings.....		Johns Hopkins University, Balt're.	
1889	Engle San. & Crema'y Co.		N. Y. City Disinfecting Station....	
1891	" " " " " "	N. Y. Hospital, N. Y.....		
1891	" " " " " "	St. Luke's Hospital, N. Y.....		
1891	" " " " " "	City Hospital, Wilkes-Barre, Pa.		
1891	" " " " " "	City Hospital, Newport, R. I....		
1892	" " " " " "	City Hospital, Boston.....		
1892	" " " " " "	Woman's Hospital, Phila.....		
1894	" " " " " "	Kingston Ave. Hospital, B'klyn.		Apartment House, Chicago.
1894	" " " " " "	Consumptives' Home, B'klyn.	Hudson Co. Institution, N. J.....	Canning Factory, Chicago.
1900	Morse and Boulger.....	Bellevue Hospital, N. Y. City...	Cornell Med. College, N. Y.....	Apartment House, N. Y.
1900	Dixon Crematory Co.....		B'kwell's Is'd Institution, N. Y....	
1901	Morse and Boulger.....	Lying-In Hospital, N. Y.....	Bellevue Med. College, N. Y.....	
1901	" " " " " "		Kings Co. Institution, N. Y.....	
1901	" " " " " "	City Hospital, Boston (2).....	Pathological Laboratory, Boston..	
1901	" " " " " "		Sailors' Snug Harbor, N. Y.....	
1901	" " " " " "	Pennsylvania Hospital, Phila...	Private Laboratory, N. Y.....	
1901	" " " " " "	Burb'k Hosp., Fitchburg, Mass.	Lab. U. S. Marine Hosp., Wash....	
1901	Dixon Crematory Co.....			Reading R. R. Sta'n. Phila.
1901	Morse and Boulger.....	Montefiore Sanatorium, N. Y....		
1902	" " " " " "	Homeopathic Hospital, B'klyn.		
1902	" " " " " "	City Hospital, Brookline, Mass..		
1902	" " " " " "	Mt. Sinai Hospital, N. Y.....		Macy's Dep't Store, N. Y.
1902	" " " " " "		Univ'ty of Mich, Ann Arbor.....	
1903	Morse-Boulger Co.....		University of Iowa, Iowa City....	Hotel Astor, N. Y.
1903	" " " " " "			Penna. R. R. Sta'n, Phil.
1903	" " " " " "			Snellenb'g Dept. St., Phila.
1903	" " " " " "	Milford Hosp., Milford, Mass....		Lith Bros. Dep. St., Phila.
1903	" " " " " "	U. S. Sanatorium, New Mexico..		Hotel Bellevue, St'f'd, P'la.
1903	" " " " " "			Hotel Martinique, N. Y.
1903	" " " " " "			14th St. Dept. Store, N. Y.
1903	" " " " " "			Hotel Belmont, N. Y.
1903	" " " " " "			Hotel Sturtevant, N. Y.
1904	" " " " " "	Samaritan Hospital, Phila.....		Zoological Garden, Phila.
1904	" " " " " "	Episcopal Hospital, Phila.....		Storage Warehouse, N. Y.
1904	" " " " " "	City Hospital, Butler, Pa.....		West'n Elec'c W'h'se, N. Y.
1905	" " " " " "	Hospital City of Mexico.....	Lab. Rock'fer Institute, N. Y....	Siegel Dept. Store, Boston.
1905	" " " " " "	St. Francis Hospital, N. Y.....	Randalls Island Institute, N. Y....	
1905	Dixon Crematory Co.....			Private Estate, Canandaigua, N. Y.
1906	Morse-Boulger Co.....	German Hospital, N. Y.....	Carnegie Library, Pittsburg.....	
1906	" " " " " "	Eye and Ear Hospital, N. Y....		
1906	" " " " " "		Jefferson Med. College, Phila.....	Hotel Plaza, N. Y.

with ships of a great squadron, or the army posts contain a large number of troops for a limited period.

Since the contracts usually go to the lowest bidders, the house construction at many of the army posts is of the cheapest and most flimsy character, not in harmony with the other permanent buildings of the post. The disposal stations at the Navy Yards of brick construction are more slightly and better suited to the purpose required.

The contract prices vary widely, being controlled by the difficulties of foundation, the local cost of material, the accessibility of the station, and consequent cost of freight and labor. As a rule the contract includes the covering houses and approaches, and furnace and chimney and all apparatus for operating.

The Furnaces for Institutions and Business Establishments—Table XXXIV

The need for a sanitary and convenient way for disposal of waste matters has always been recognized by those in charge of institutions devoted to the prevention and mitigation of human suffering, the care of the feeble and infirm, and the control of those mentally or criminally unable to care for themselves. These hospitals, asylums, sanitariums, and prisons have always present the problem of dealing with waste in a larger volume than would be produced by the same number of persons in ordinary conditions of life, and are often at a serious disadvantage as compared with the means of disposal offered by the usual municipal agencies, the use of which, in most cases, they are debarred from employing. Commonly, this institutional waste is burned under the boilers and heaters, but this is unsanitary and objectionable, always to the detriment of the boilers and causes complaints from the engineers and firemen, whose regular work is interfered with. Certain kinds of hospital, medical school, and laboratory refuse cannot be disposed of in this way, but must be removed often at great cost.

Again the accumulation of a large volume of refuse, inevitable in great business establishments, becomes troublesome, and the same difficulty arises in hotels and places where large numbers of persons are brought together for special reasons for short periods of time. As a rule the towns do not provide for the removal of institutional or trade refuse, and the burden is upon those in charge.

Hence the development of destruction methods for institutions and business houses by incineration in properly constructed furnaces has been far more rapid, more satisfactory, and more sanitary than has attended the methods of disposal by municipal agencies.

The Institutional Crematories

In table XXXIV. are brought together the American installation of garbage and refuse cremating furnaces, other than those for municipal and governmental use.

They comprise a large variety of forms and methods for waste disposal by incineration that are not familiarly known.

The First Laboratory Furnace.—In 1886, Dr. John S. Billings, the well-known sanitarian, then connected

with Johns Hopkins University, of Baltimore, designed a furnace for the destruction of small dead animals, for use in connection with the work of the Pathological Laboratory at the University. This was a small fire-box built alongside the main chimney of the building in the laboratory room, having an inclined hearth or small chamber at the left side, with a door for receiving the bodies, and above, a second inclined hearth, with door, which leads to a second fire-box below the fire-bars.

The principal fire below consumes the bodies placed on the two inclined hearths, the fumes and products of combustion passing through the upper fire-box are consumed or deodorized before being discharged into the chimney.

This is believed to be the first laboratory furnace brought into use and is still in service, but limited to the disposal of very small animals, and the debris of bacteriological investigations that must be burned.

The First Municipal Institutional Furnaces.—Beginning with the Engle Cremator, built by the writer in 1889, at the disinfecting station, East Sixteenth street, New York City, there followed a long series of installations for the great hospitals in New York, Brooklyn, Boston, and Philadelphia, and many smaller places, built mostly by one concern.

This first furnace in New York, see Table XXXII, No. 20, is a striking instance of the value of such an appliance in times of great emergency, when the health of the city is menaced. During the typhus fever epidemic of some eight years ago, for weeks together there was burned in this furnace many thousands infected articles, mattresses, beddings, clothing, furniture, etc., and in the sixteen continuous years of its service several millions of infectious pieces have been destroyed with rapidity and perfect sanitary protection from contagion. Taken in connection with the great steam and formaldehyde disinfection apparatus installed by the writer in the adjoining building, it is one of the chief agencies of the city for sanitary protection and the largest of its kind in the country.

New York City and Brooklyn have four installations at the various groups of institutions, and three others in the largest hospitals under municipal control. Boston has four furnaces in different departments of the great City Hospital. Chicago has a large equipment at the Cook County institutions, and Jersey City a large crematory at the Hudson County institutions. Many of the large cities and towns are still without this most necessary apparatus for efficient disposal of these dangerous kinds of waste. It would seem that if there is any case where such a device is useful it would be at the stations and hospitals where the worst forms of infectious and contagious diseases are received and treated. Instances are on record where the employees of the street-cleaning service have contracted disease and death from the removal of this infected matter by the city's carts.

The First Hospital Installation was that at the New York Hospital, West 17th Street, in 1891. This is a

special design by the writer after the Engle pattern and the first steel case garbage furnace construction built in this country.

This was followed by others at St. Luke's, Bellevue, Lying-in, Mt. Sinai, German, St. Francis hospitals, and several smaller ones. Philadelphia has furnaces at the Pennsylvania, Samaritan, Episcopal, Jefferson and several of the smaller hospitals, and other towns have followed these examples.

The need of this help to efficient sanitation is universally recognized by the officers in charge, but there is sometimes difficulty in finding convenient room in the older institutions, and often a lack of funds for construction. The latest modern hospitals usually provide space for destructor furnaces, though not all build them. There are few reports from these installations, but their usefulness is so great that once they are built they are rarely allowed to go out of commission, and there are but one or two cases of discontinuance.

The Medical Schools and Laboratories.—Following the example of Johns Hopkins University, the medical colleges have found it greatly to their advantage to install small powerful furnaces for the disposal of a very refractory and objectionable form of refuse. These special constructions in one or two cases employ oil as fuel; in others, gas, natural or artificial, is used with equally good results.

All laboratories use fire for the destruction of certain substances, but for pathogenic and bacteriological work a different and larger form of destructor is found to be indispensable. These constructions are of special form, placed often on the upper floor of buildings, using any available fuel, and are compact, very powerful and serviceable.

Installations for Hotels.—The addition of a garbage furnace to the machinery equipment of a great modern hotel involves but comparatively small cost, and provides a rapid and satisfactory way to get rid of objectionable waste—the removal of which entails cost and often causes nuisance. When the usual agencies of removal are interrupted by storms or unforeseen accidents, there is always trouble, and the accumulation of two or three days becomes a serious question to deal with. The architects and engineers of the latest great hotels now provide for the installation of furnaces, and arrange for their flue connection with the smoke flue or direct with the chimneys. The great height of these chimney-stacks and strongly induced draft does away with the necessity of a forced draft at the destructor. The capacity of these furnaces, burning every form of waste matter produced, excepting only the ashes from the boiler fires, is sometimes five to eight tons daily, as large as would be built in a town of 5,000 to 8,000 people.

The heat developed is sometimes utilized in separately attached steam boilers employed in the minor service of the hotel, or may be used for heating the feed water of the main battery of steam boilers.

For apartment-houses a smaller form of furnace is constructed, and this may be fitted with coils of piping for the hot-water supply of the building. All these furnaces must be provided with approved apparatus for destroying the noxious gases thrown off, or there may be complaints of nuisance.

The Business Installations

Business men of the present day as a general rule recognize the value of by-products, and do not destroy refuse of any kind until the last salable item that can be extracted is taken out. There are many examples where the by-product to be had from apparently worthless matter, when intelligently treated, is worth nearly as much as the original substance.

But, whatever may be the process, there still remains a last and ultimate form of refuse that is best disposed of by incineration, and there is probably no better illustration of the usefulness of special furnaces for destruction by fire than instances shown in table XXXIV.

Under the head of trade refuse is included every class of waste produced or remaining unsalable in trading or business establishments or manufacturing industries. As a rule the removal of this is not done by the town, though the town furnishes a place for its deposit, and the oversight of the means for handling it.

Within the past few years it has become evident that incineration on the premises is more convenient and economical, as the cost of a properly constructed furnace can be saved in a year or two.

The First Installation.—The Macy Department Store, in 1902, was the first of this class of business establishments to destroy its waste within the building. A special form of furnace was designed by the writer and placed in connection with one of the steam boilers of the building.

The waste from each floor is discharged through a chute to the receiving room, the salable parts sorted out, and the remainder, with the refuse from the restaurants and all worthless matters, is destroyed. This same design was afterward adopted at several large department-stores, and at various warehouses and factories with equally good results in every case.

The waste from great railroad stations is destroyed quickly and without offense, but demands a special form of furnace suited to the mixed character of refuse.

This method can be employed with great advantage in a great variety of cases when the disposal of waste is difficult to deal with in the usual way.

In General.—Beginning with the Bellevue Hospital, in 1900, the writer, in company with Mr. B. Boulger, designed and built many furnaces for hospitals, colleges and hotels. Subsequently, in incorporated form, the Morse-Boulger Destructor Company erected many of the furnaces comprised in the list.

The writer terminated his connection with this corporation at the close of 1904, and the business of this company has since been carried on by others.

In compiling these tables the writer has placed on record the available details gathered in several years of personal attention to the construction of furnaces for special and particular purposes not generally connected with the general line of municipal waste disposal. These details have heretofore been made public only through the medium of trade publications and catalogues, but they are believed to contain some value for the officers in charge of institutions as well as the business houses engaged in trade and manufacture. There are, doubtless, many furnaces installed by private parties, destroying successfully many kinds of worthless matter, the construction of which follows none of the types or designs here recorded.

To make this subject more complete and accurate the writer would be pleased to receive any additions to the list or corrections of errors that may have inadvertently been recorded.

SPECIFICATIONS FOR TARRING ROADS

Method Employed by an English Engineer Described in Detail—Use of a Tar Binder in Macadam Roads —Cost and Other Data

MR. ARTHUR GLADWELL, Engineer and Surveyor to the Eton Rural District Council, England, describes in *The Contract Journal* the following method of employing tar on macadam roads. It will be noted that he practically uses the old road as a foundation, and applies to this a surface coat of tarred macadam, which, however, is not mixed before placed upon the street.

1. If the road about to be surfaced is an old road, make up all depressions or puddle holes therein and generally strengthen the foundation with the best available materials so as to bring the old surface up to a reasonably correct contour. If a new road is about to be surfaced, the above precaution will have been rendered unnecessary, as the foundation will have been properly prepared.

2. *Matrix*.—Obtain or make a matrix or flux of tarred slag or macadam, made with screenings about $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch gauge (if not obtained from any of the firms who manufacture this kind of material), which should contain such proportions of distilled tar, pitch, resin, lime, or cement as practice or experience may dictate as the best, and spread this matrix or flux evenly and to a thickness of about $\frac{3}{4}$ inch over the old surface; no scarifying or tarring of the old surface is necessary.

3. *Aggregate*.—On the matrix or flux spread a coating of granite or such other good road material as experience has proved to be suitable to the traffic of the district in which the road is situate. This coating should be about two stones in thickness, broken to as square a section as possible, and not less than 2-inch gauge. All flaky or indifferently broken material should be rejected, and care should be taken to keep the aggregate clean and free from foreign matter, so that it may form an amalgam with the matrix. (In districts where granite is not

available, other materials, such as limestone, flints, etc., might be used, but experience will prove that the use of the best materials will tend to ultimate economy.)

4. Immediately roll the granite down into the matrix with a 10 or 12-ton steam-roller, taking care that the pace of the roller is retarded during the first two or three journeys over the new surface. Afterward it will be found that the new work will stand any amount of rolling without in any way punishing the material. Keep on rolling until the matrix or flux appears in the interstices of the granite surface; if an excess quantity of matrix material has been used, this will appear on the surface too soon. It has been found that if the matrix begins to appear after the roller has been over the surface fifteen to twenty times, the proportion of matrix to aggregate is about right. It is important to remember that the best results will be obtained by using the minimum quantity of matrix necessary to consolidate and hold the aggregate in position. No watering carts or sweepers will be necessary. The cost of these will be a set-off against the extra cost of tarred or bituminous matrix material over sand, hogging, or chippings. Do not put a single ounce of sand or dust into the structure of the road or on its surface. If the matrix works up to the surface before the rolling is completed, and exhibits a tendency to adhere to the roller wheels, lightly sprinkle the latter with water from an ordinary watering-can.

General.—In the foregoing the operation of resurfacing a road to a thickness of about three inches has been described. If it is required only that a road should be treated with a thin coating of new material, the operation under this system will be precisely similar to that already described, so long as the due proportion of aggregate to matrix is observed. The same may be said if only slight repairs to existing road surfaces were undertaken, with this difference, that the old road surface at the edges only of all new patches would require to be picked up to form of key.

The author believes that it will cost no more to resurface a section of road under his system than under the old system of binding with sand, chippings, etc., while the "life" of the road will be considerably increased. If no binding sand, road scrapings, or other material of like character is introduced into the structure of the road, it follows that no mud will exude therefrom, thus considerably minimizing the cost of cleaning.

Where Water Meters Are Popular

IN a great many cities, generally those where the waterworks are under municipal control, efforts are being made and have for years been made by the Superintendents to obtain from Councils their consent and appropriation for installing water meters, too often ineffectually. But in Peoria, Ill., the citizens are demanding the privilege of receiving their water supply through meters, and the water company is reported as refusing to permit these to be inserted in their pipes. In many of the smaller cities of the State meters are in general use, thirty-five to fifty cents per 1,000 gallons ($26\frac{1}{4}$ to $37\frac{1}{2}$ cents per 100 cubic feet) being the price in several of them.

NEWS OF THE MUNICIPALITIES

Divers Subjects of General Interest and Their Treatment by City Councils and Officials—Streets, Waterworks, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

Roads and Pavements

TERRE HAUTE, IND.—The City Council has ordered the construction of six miles of cement walk in various portions of the city, the aggregate cost of which will be about \$18,000. When the improvement is completed there will be but about thirty blocks in the city unimproved with new cement walks. Four claims for damages against the city for personal injuries on account of bad sidewalks have made the City Council improve every walk in the least bit defective.

YOUNGSTOWN, O.—Partly as a result of private agreement and partly by appropriation the property necessary for the widening of West Boardman street has been secured. Most of the property owners on the south side of the street agreed to donate a strip of 13 feet, while the north side owners agreed to give \$10 per foot frontage. Altogether \$6,000 worth of property will be appropriated and nearly \$5,000 will be given. The city itself owns 207 feet on the north side, which will be greatly enhanced by the improvement.

PITTSBURG, PA.—Mayor George W. Guthrie has granted a permit to the Pittsburgh Dock Company to use 250 feet of frontage above the Sixth street bridge. The company is to pave the wharf with granite blocks free of expense to the city, and pay \$3 per foot per annum for rental. The city hitherto has been deriving no income from the property. The permit can be revoked whenever the interests of navigation require.

Sewerage and Sanitation

CHICAGO, ILL.—Owing to the presence of from 10,000 to 15,000 cases of contagious diseases, mainly scarlet fever, in Chicago and its suburbs, extraordinary precautions are to be taken. The Commissioner of Health, Dr. Charles J. Whalen, has asked the public to suspend all balls, parties and social gatherings until the epidemic is under control. Dr. George W. Welster, President of the State Board of Health, has formed plans for an "emergency public health conference," which will be held in the Art Institute, under the auspices of the State Board, the City Health Department, the Chicago Medical Society, and several other organizations.

FORT SMITH, ARK.—The big sewer north of the city is to be extended on under the Iron Mountain and Frisco tracks to North Eighteenth street, where it takes a turn for the south. The engineering corps of the Board of Improvement has made a survey for a miniature road to parallel the sewer on Eighth street for the purpose of carrying cement and other supplies to the work.

FORT WORTH, TEX.—Max Bender, of the force of health officers, who has inaugurated a sanitary crusade, states that he has made splendid headway, and the Ninth Ward, which has been the scene of his labors, presents a clean, healthful appearance, compared to conditions formerly existing. Mr. Bender says that the people whom he visited and to whom he pointed out places that were unclean and germ-producing complied promptly with his requests, and that as a result many conditions unfavorable to health have been obliterated. A few more days' work in the Ninth Ward will finish the undertaking, and then Officer Bender promises to give his attention to other portions of the city.

GREEN BAY, MICH.—Sewer, water and gas connections in sufficient amount to satisfy whatever change in the subdivision of property is likely to take place was the subject of a report made by the Committee on Sewers and Plumbing. Hereafter one sewer, water and gas connection must be laid where the street runs alongside of lots 60 feet in depth; two sewer, gas and water connections where street runs alongside of lots 120 feet in depth; three sewer, gas and water connections where street runs alongside of lots 165 feet in depth, and four sewer, gas and water connections where street runs alongside lots 240 feet in depth.

NORFOLK, VA.—A plan to dam Smith creek, where it crosses Duke street and provide flood gates and operate them, so as to keep the region about the gas house under water at low tide was proposed to the Board of Control by the Citizens' Commission, and it will be favorably recommended by them to the City Council. The other alternative is to dredge the entire end of the creek below the low water line, so that no land with its deposits of gas house waste need be exposed.

PENSACOLA, FLA.—City Health Officer J. Harris Pierpont has reported on the data collected by his inspectors as follows: The total population is estimated at 22,646; of the 5,632 buildings in the city 4,831 have one story, 780 two stories, 18 three stories, one four stories, one five stories, and one seven stories; of these buildings 2,424 have city water, 2,669 have pumps, 47 are supplied by tanks, 313 by wells, and 179 have no water on the premises; 492 have sewerage, 232 cesspools, 4,810 are on ground, and 97 have no closets; fifty-three cases of bad water were reported, and 246 closets were found in bad order.

WINNIPEG, CANADA.—The Board of Control has made a recommendation to the Council on awarding the contract for civic plumbing in 25 houses. It is stated that the plumbing will cost between \$80 and \$85 for each house. This is the first batch of houses in which plumbing will be installed under the powers obtained from the Legislature to issue debentures for the cost of plumbing in houses of persons who are financially unable to undertake the work. The cost is assessed against the properties improved, and is to be repaid to the city in seven annual installments.

Waterworks

ATLANTA, GA.—At a meeting of the Board of Water Commissioners it was decided to have literature prepared for distribution to inform the public of the requirements of the waterworks, and urge the necessity of issuing \$500,000 bonds. The print, which will be prepared by Commissioner Hancock and Manager Woodward, will show exactly the work now being done by the Department, the income which the city receives both in cash and free public service, and the specific improvements which are recommended.

BALLARD, WASH.—One-half of the city of Ballard was without water recently, and some of the citizens were obliged to resort to melting snow for their domestic supplies. At the City Hall, where the pressure should be 85 pounds, there were only 30 pounds registered. The pumping plant is handling 947,000 gallons of water in

24 hours, an amount greater than it has ever handled before. A new million-gallon pump has been installed, and it is believed that with both pumps working about 1,300,000 gallons of water can be pumped from the three wells.

BUFFALO, N. Y.—Mayor J. N. Adam has sent to the Common Council his approval of its action in authorizing Col. F. G. Ward, Commissioner of the Public Works Department, to contract with the Buffalo Dredging Company for the construction of the new intake, piers, tunnels and shafts in connection with the improvement of the water supply system. In his message Mayor Adam expresses his gratification that the matter has been definitely settled.

BURLINGTON, VT.—According to the report of the Board of Water Commissioners, T. F. Conlon, G. W. Kelley and J. E. Lanon, the receipts during 1906 were \$45,561.98. The total number of gallons pumped during the year was 368,000,000, a decrease from the total of 1905 of 17,000,000. The bonded debt of the Department is \$188,000. The appropriation for the year was sufficient to meet all the expenses of the Department, including interest, \$1,370.52, and sinking fund, \$12,418.90, an amount in excess of the 5 per cent. of the appropriation required by ordinance.

COLUMBIA, S. C.—As was expected, several breaks occurred in old water mains when the pressure was turned on from the new standpipe. One of the breaks, on Main street, flooded the cellars of adjoining stores, so that the Fire Department had to be called on to pump the water out. The breaks along Main street are presumably the result of weakening of pipes through electrolytic action.

GLOUCESTER, N. J.—The Water Committee of the Gloucester Council has endeavored to discover the source of heavy discrepancies in the water supply of the city. It has been known that the consumption was out of all proportion to the ordinary needs of the people of the city when compared with that of other cities, and it has been generally concluded that there is something wrong. Several manufacturers were called upon to explain how much water they are using, but it was found that the trouble could not be located there, and the Committee will endeavor to trace it by other means.

LOUISVILLE, KY.—Property holders are seeking advice as to whether to install water pressure regulators in anticipation of the increased pressure soon to be used. The cost of putting in a regulator is estimated at from \$15 to \$25. Most plumbers are of the opinion that water pipes installed within the last ten years will prove equal to the additional strain to be placed upon them at the completion of the new filter.

NIAGARA FALLS, N. Y.—Regarding a petition pending before the directors of the East Falls Waterworks Company, Corporation Council Mackenna expresses the opinion that the company cannot be forced to lay the desired main. Under the terms of its contract it may make improvements only where there is a certainty of a sufficient return to pay the interest on the investment.

PHILADELPHIA, PA.—Many of the streets in the city are in bad condition, due to the work of laying mains for filtered water. Mayor Cassius M. Gillette, chief of the Filtration Bureau, attributes a large part of the delay to incomplete and inaccurate plans of underground structures. The difficulties are experienced particularly at intersections, where it has been found necessary to secure new pieces of elbows or curved pipes of different angles from those on hand, in order to get above or below sewers, water pipes, gas mains, and other obstructions, which were encountered at different depths below the surface from that expected. This trouble is being met in all of the twenty-one places in the city in which work is going

on. Where the laying of the straight pipes is completed and testing is going on, the intersections are left open while elbows are being manufactured. Another vexatious delay was due to the slowness of Council in making appropriations.

PORTLAND, ORE.—Portland Heights will have an abundant water supply if the recommendations of Engineer D. D. Clarke, of the City Water Department, are approved by the Water Board. The proposed plant will cost approximately \$35,000, and will consist of a mammoth reservoir on the Heights of 300,000 gallons capacity, a 12-inch main from the City Park reservoirs to the new reservoir, a distance of 9,600 feet, and a large pump at the City Park pumping station of sufficient power to pump 500,000 gallons of water a day from the City Park reservoirs to the Heights.

RENO, COL.—The city has been without water as a result of the breaking of a 36-inch siphon leading from the highland ditch to the reservoirs of the Reno Power, Light and Water Company. When the siphon broke the reservoirs were soon drained, and the water in the ditch standing still soon froze solid for a distance of more than a mile. Two hundred men have been at work cutting ice out of the canal and doing other work.

SPRINGFIELD, MASS.—Final action securing for the city the Little river water supply has been taken by the Board of Water Commissioners. The waters taken are those of the Westfield Little river and its tributaries, at, above, and westerly from the place of diversion, that is at a point on the river 400 feet above mean sea level. A tract of land of 396 acres in Little river gorge, including practically all that is wanted for the intake and tunnel, was also purchased.

Street Lighting and Electric Power

BURLINGTON, VT.—The Board of Electric Light Commissioners has made its first report covering a year's service of the plant. The total earnings of the plant are \$24,136.18, and the expenses, including interest on bonds and all operating expenses, have amounted to \$20,204.11, leaving a net gain for the year of \$3,931.97. During the year there have been installed and maintained sixteen additional street lights, making a total of 234 arc lights. For these sixteen lights only \$103.33 in excess of the previous year's cost has been credited to the plant. Considerable new equipment has been added during the year.

JOLIET, ILL.—A bid for street lighting from the Sanitary District of Chicago enables the Council to estimate \$33.21 as the cost of electric arc lights for the coming year, as compared with \$78.50 bid by the local company. The estimate is based on power furnished at \$15 per horsepower. Other items of annual expense are estimated as follows: Carbons, \$3.75; globes, \$1; repairing lamps, \$2.25; repairing circuits, \$3.25; trimming, \$5; interest, \$3.50; depreciation, \$3.50. In addition to the offer of \$15 per horsepower, delivered at the plant in Lockport, the district agrees to build a transmission line to the city, making the following annual charges: Repairs, 2 per cent.; interest, 5 per cent.; depreciation, 5 per cent.

MANCHESTER, VA.—Anticipating the ending of the present contract by which the Virginia Passenger and Power Company gives the city seventy arc lights a year free of cost, the City Council is considering the proposition of either building an electric-light plant or giving a contract for supplying the city with lights. The value of the free lights which the city has been enjoying is estimated at \$5,000 per year. The present impression is that the city will purchase the poles from the company and engage in commercial, as well as street lighting.

MARION, IND.—T. M. Barnsdall, of Pittsburg, the owner of the Marion Gas Company, the only concern supplying Marion with gas, has notified L. A. VonBehren, the local manager for the company, to refuse to accept the one-year franchise passed by the City Council, for the reason that the term of the franchise is too short and the restrictions too exacting. He has also authorized Mr. VonBehren to announce that the price of natural gas will be raised at once from 30 to 50 cents a thousand cubic feet. The plan to mix the natural and manufactured gas will be dropped, and only natural gas will be supplied.

NIAGARA FALLS, N. Y.—The Common Council has adopted resolutions instructing the Lighting Committee and the Corporation Counsel to prepare an amendment to the city charter for introduction at the present session of the Legislature, providing for the installation of a municipal electric-light plant, and also authorizing the Committee and the City Engineer to investigate the cost of public and private lights in the city of Niagara Falls, as compared with other cities, and the cost of electric power to private consumers and small manufacturers.

WATERTOWN, N. Y.—The State Commission of Gas and Electricity has denied the application to consolidate local lighting interests. Capitalization at \$1,800,000 was proposed by the Watertown Gaslight Company and the Watertown Electric Light Company to obtain additional water power. The Commission decided it would be against the interests of the consumers to permit consolidation. Objection was made because it would force consumers to accept what the unified interests would offer and the capitalization was considered excessive.

Fire and Police

EAU CLAIRE, WIS.—The Fire and Police Commission has submitted to Council a plan to greatly increase the efficiency of the Police Department. The difficulty to be solved arises from the necessity of the Desk Sergeant at Headquarters leaving the station to visit the scene of some trouble, or go to find a patrolman for that purpose. The proposition is in regard to the acceptance of an offer of a liveryman to keep a team of horses harnessed to the patrol wagon at all times and furnish a driver for \$1 a call.

ELKHART, IND.—With a view of ascertaining the water pressure, a fire box was pulled. The dial at Central indicated 62 pounds pressure; within seven minutes the pressure was at 100, and in ten minutes more the pressure stood at the maximum of 105. The company that responded to the call of Chief Leader attached a hose to the nearest hydrant, ran a hose 500 feet to the factory, and in the face of a strong wind the stream was easily directed to the roof of a two-story factory. When the maximum pressure was reached a stream was thrown 65 feet.

HARTFORD, CONN.—At a conference of Council Committees and other city officials regarding the reorganization of the Fire Department on a permanent paid basis, President Charles E. Parker, of the Fire Department, spoke in favor of the proposed change. He stated that the city paid from \$13,000 to \$14,000 annually for call men, many of whom could not get to fires within the twenty-minute time rule. For a permanent paid department \$132,000 would be required, \$23,000 more than last year's appropriation, and besides \$2,500 more would be required the second year, \$2,300 the third, \$1,200 the fourth and \$1,000 the fifth.

LOUISVILLE, KY.—In accordance with instructions of the Board of Public Safety, Colonel Sebastian Gunther has issued orders that the police need no longer wear belts. The reason given is that belts tend to wear out

the uniforms of the policemen, and are of no material benefit. Some time ago the night men on the force abandoned the use of the belt.

LYNN, MASS.—At a conference with Mayor C. Neal Barney, Hon. Eugene A. Bessom, of the Water Board, Supt. Daniel A. Sutherland, of the Water Department, and Inspector S. Oliver Breed, Chief Engineer Harris, of the Fire Department, expressed his views of the needs of the city for fire protection. He said it would be more feasible for the city to lay mains for an independent high-pressure service, to be used only for fire purposes, than to disturb the present piping before there was any other reason for renewing it. His idea was to lay a large main from the pumping station on Walnut street directly into the business center of the city, where a loop might be laid out that would afford ample protection to all parts of the danger zone. The expense of this would be considerable, but he said he was satisfied that the returns would be equal to the expenditure. This pipe line would carry water under high pressure directly into the congested district, instead of feeding auxiliary pipe lines for household purposes. If this was a 36-inch main, with plenty of pressure behind the water, the present service would be greatly improved, and there would be much less danger of large conflagrations.

PHILADELPHIA, PA.—The twenty-two police matrons have been supplied with badges, and Superintendent Taylor has issued orders that matrons must wear them when on duty. The duties of matrons will be extended in the future, and it is expected that they will respond to alarms with the patrol wagons in order that they may give assistance to women who may be injured.

READING, PA.—The Firemen's Union, at its annual meeting, took exceptions to Mayor Gerber's statement, made in his annual message, that the city needs a paid Fire Department. A committee was appointed composed of a member from each company to investigate the efficiency of the Department as compared with that of other cities of like size as determined by the records of the past five years, and also to make suggestions that may lead to more efficient service.

TERRE HAUTE, IND.—Mayor Lyons has decided to appoint a wire inspector. This was brought about by the necessity for the chief of the Fire Department to warn the public not to try to send in alarms from the boxes because of the danger of electric shocks. False alarms have lately been rung in consequence of the defects in wiring.

Government and Finance

COLUMBUS, O.—The suggestion that Council pass ordinances requiring dripping pans for automobiles, to save the asphalt streets from the damaging effects of the oil, and compelling property owners to keep the sidewalks in front of their property free from ice and snow, started a search at the City Clerk's office for old ordinances that might cover these subjects, and Assistant City Clerk Leroy Rose found that there are already on the city's statute books ordinances that seem to be applicable at this time, and that prove the old saw: "New laws are needless, as all that is necessary is to enforce old ones."

FERGUS FALLS, MINN.—The City Council is making a strenuous effort to secure interest on the city's funds. The charter provides that funds may be deposited in the bank or banks, located in Fergus Falls, offering the highest rate of interest, but as the money is already deposited in the banks without interest, none of them are showing any inclination to bid. The city now has about \$40,000 on hand, owing to large accumulations in the electric-light fund, the money has been lying idle for a long time. The Council has called upon the City Attorney to

know whether a charter amendment will be sufficient to authorize the placing of funds in outside banks.

GALVESTON, TEX.—Mayor-President Landes states that Galveston has prospered in consequence of its commission form of government. At the commission meetings business is dispatched quickly and harmoniously. The City Hall is free from place-hunters, as a request in writing from any citizen receives the consideration of the meeting. Since its organization the commission has paid off \$594,689 for old claims.

GREENVILLE, TEX.—Greenville has become a city of the first-class, having more than 10,000 inhabitants. Desiring a charter in keeping with its new dignity, the city has sent Mayor J. F. Nichols to Dallas to confer with Dallas officials who are posted on charter questions. Greenville and Dallas will soon be connected by an interurban line.

MACON, GA.—Mayor Smith has adopted a new scheme for dealing with the Chairmen of the standing committees of the City Council, and keeping them informed of the financial condition of their departments. At the end of each month a report will be placed in each alderman's box showing how much has been spent by his department up to date, and how much remains to the credit of the account.

ST. LOUIS, MO.—The Civil League's reasons for wanting a revision of the city charter are that there is great confusion in the present charter respecting matters of legislation and administration. There is no provision for the removal of inefficient officials. It is desired to introduce the merit system as regards appointments; to reorganize the police; to establish a department to control public utilities, and grant franchises; to increase the power of the Board of Public Improvements, so as to enable it to undertake a general scheme of improvement, and a more equal system of taxation.

TOLEDO, O.—City Auditor Bacon's annual statement of the city debt shows that the percentage of the general debt to the estimated taxable valuation of city property has been reduced from 8 to 7 per cent., and the percentage of special debt to the tax valuation from 1.4 to 1.1 per cent. There were, on December 31, 1906, \$1,063,227.17 special-improvement bonds unpaid. The general bonds outstanding on the same date were \$7,292,113.85, or, with sinking fund deducted, \$6,019,269. The valuation of the city is, real property, \$58,591,120; personal property, \$18,727,160. The population of the city is about 140,000.

WILMINGTON, DEL.—The seventy-fifth anniversary of the adoption of the Wilmington charter was recently celebrated by a banquet in the First Regiment Armory, where plates were set for nearly 400 persons. The occasion was participated in by delegates to the Convention of Municipalities, members of the City Council, Board of Trade, Mercantile Association, and State and County officials and members of the Legislature. One of the ideas of the dinner was to bring together men from different parts of the State and put an end to sectional feeling.

Refuse Collection and Disposal

BIRMINGHAM, ALA.—The committee appointed by the Police and Sanitation Committee consisting of Aldermen C. C. Heldt, Simon Klotz, Thomas Simms and Street Commissioner McCartin, has returned from a trip to Memphis, Tenn., where they went to inspect a city crematory. All are in favor of a city crematory since visiting the Memphis plant. They say it is hard to understand how Birmingham has been willing to rid itself of the trash in such a manner as has been done in the past. The committee will make a report, and active steps will be taken looking to the erection of a crematory.

CINCINNATI, O.—The main building, vats and tanks of the Cincinnati Reduction Company, and Anderson's Ferry, burned, January 25, with a loss of \$70,000. The plant is surrounded by water, and for half an hour firemen were unable to get to it, and the surrounding waters hampered them greatly. The works cost \$160,000.

KNOXVILLE, TENN.—The disposal of garbage is one of the hardest problems the Board of Public Works has to solve. Years ago the trash pile was in Gunter's flat, in the heart of the city, but this has long been occupied by business houses, and the bottoms and low places along Cripple creek have been filled with garbage. For the past few years the dump has been in West Knoxville, from which section complaints of papers blowing about are frequently made. During 1906, 30,000 loads were collected. Two-mile hauls, requiring larger appropriations, are the present prospect.

Parks and City Beauty

ATLANTA, GA.—Among the items included in the appropriation of \$46,216 for parks is one of \$10,000 for the improvement and beautification of Piedmont Park. Commissioner Ellis suggested that the old lake be made into a kind of sunken flower garden, that the large enclosure within the race track be changed into a children's playground, that the race track be retained for a speedway, and that all the buildings be torn down except the Government, Agricultural, Georgia State and Fire buildings. The commission approved of the suggestions made by Commissioner Ellis, and improvements along this line will be made.

NEW YORK, N. Y.—Plans have been prepared to establish, in Tottenville, three parks, including the historic Bollop House, the oldest building in the city of New York. It is intended to soon call a public meeting in Tottenville, when the plans will be submitted for acceptance.

NORFOLK, VA.—The Board of Control has decided to install several ornamental posts for fire and police alarm boxes, and have ordered six at a cost of \$303.50 as a beginning. It is the intention of the board to replace all of the present wooden posts with these steel structures, as they are practically indestructible, give better protection to the wiring, situated in the center, and add greatly to the looks of the city. They will be ordered from time to time, and paid for out of the current expense account of the two departments, in lieu of replacing rotten poles, etc.

POUGHKEEPSIE, N. Y.—William W. Smith, who has given away within a few years \$200,000 of his fortune to local charities and benevolent institutions, has announced that he will contribute \$10,000 toward the cost of erecting a city infirmary, and the offer has been accepted. Mr. Smith's last previous gift to the city was of College Hill Park, of which he made an unconditional transfer. None of the institutions founded by Mr. Smith bears his name.

SAN FRANCISCO, CAL.—President Spreckels, of the Park Board, stated at a recent meeting that he had been informed by E. J. Molera that the California Academy of Sciences desired to build a museum, and considered Golden Gate Park the most available location, to take the place of the museum formerly located in the Academy Building, on Market street near Fourth. The society had \$250,000 on hand for the purpose of erecting a suitable building, and it wanted to know whether the Park Commissioners would consent to have the building erected in Golden Gate Park. Informally it was stated that there would be no objection to such a building in the park, when proper application should be made.

SOUTH BEND, IND.—The Beyer tract of fifteen acres will be bought for \$10,000, and added to the park system.

The Beyers family will donate to the city a boulevard strip through their property. The purchase is made providing for the future, and not for immediate improvement.

Rapid Transit

ATLANTA, GA.—Alderman Key presented a resolution to Council to compel street car companies to furnish transportation to passengers for one cent when they are not provided with seats. The resolution, at the request of the introducer, was referred to the Committee on Freight Rates and Transportation.

PITTSBURG, PA.—In order to relieve conductors of some of their duties during the rush hours, the Pittsburgh Railways Company has employed fifty students from the Carnegie Technical School to act as helpers during these periods. The "trolley boy," as they are called, boards the car at the downtown terminus and remains on the rear platform, where he assists passengers on and off the car, gives the bell signal to the motorman, keeps account of the number of passengers boarding the car, and replaces the trolley wheel when it comes off the wire. This enables the conductor to devote his entire time to collecting fares, prevents needless delays, and avoids accidents. When the conductor has completed his task of collecting fares and is enabled to give his attention to the rear end of the car, the assistant leaves him and boards the next car downtown. James D. Callery, President of the Company, is much pleased with the innovation and has decided to extend the system as rapidly as possible, and make it permanent in case a thorough test proves it to be the success which it has so far proven.

JACKSONVILLE, FLA.—The use of stripes, one for each two years' service, after five years, on the uniforms of inspectors, motormen and conductors employed by the Jacksonville Electric Company, has gone into effect, in accordance with the recommendation of the late S. E. Williams, manager of the company. The oldest employee of the company, Captain Douglass, has six stripes; Inspector Whitehead is second, with five.

JERSEY CITY, N. J.—Mayor Mark M. Fagan has signed an ordinance passed by the Board of Street and Water Commissioners, providing that all corporations operating trolley cars in the city shall be required to run a sufficient number of cars from their terminals at the Pennsylvania and Erie Railroad depots, between the hours of 5.30 A. M. and 7.30 to furnish with seats all persons from whom fares are demanded. The ordinance also requires that during the evening rush hours persons desiring transportation from these terminals "shall not be kept waiting longer than five minutes." The penalty for each violation of the new regulations was fixed at \$50.

PHILADELPHIA, PA.—Three business men's committees, in addition to the Rapid Transit Company, are at work on Philadelphia's passenger transportation problem. According to an act of June 7, 1901, six systems of elevated and six of subways were provided for. After nearly six years, a part of the Market-street subway is in operation, and a larger section will soon be opened. No finished work is in sight on the other eleven lines. The surface lines cannot make high speed, owing to the short length of blocks, and to consequent inability to get up a high rate of speed. The Rapid Transit Company seems unable to finance the elevated roads and subways for which it has franchises. This company has a capitalization of \$165,000,000, of which \$76,750,000 is said to be incorporeal. A solution of the difficulty suggested by one of the civic organizations is a partnership between the Transit Company and the city on the basis of the city lending credit and sharing in the revenue. Another association advocates forcing the company to give up its franchises, and the introduction of some plan of municipal ownership.

Miscellaneous

CHICAGO, ILL.—An industrial exhibition, showing good and bad conditions under which men and women work in this country, with special attention to the conditions under which they work in Chicago, will be held in March under the auspices of a group of Chicago organizations interested in promoting the industrial welfare of the community. The exhibition will be supplemented by material from the Exhibit of Industrial Conditions, held in Philadelphia, and the Exposition of Safety Devices, held during the current month in New York.

JEFFERSON, Mo.—Senator Doris has presented to the State Senate an amendment to the constitution to permit cities of 200,000 inhabitants or more to acquire street railways. The amendment provides for acquiring existing street railways or property to be used for street railways by condemnation proceedings, the value of the property to be determined by a petit jury. Funds for such purpose may be provided by a bond issue, to be approved by three-fifths of the legal voters.

NEW YORK, N. Y.—A plan for a type of tunnel, proposed as a substitute for bridges, has been drawn by Mr. D. D. McBean. The scheme is advocated especially for a system of thoroughfares under the East and North rivers. Mr. McBean proposes to construct a tunnel at least 100 feet in width, with sufficient room for roadways for teams and automobiles, four car tracks and sidewalks. Such a tunnel is estimated to cost less than any bridges of equal capacity. For the terminals a system of elevators is proposed for cars and teams as well as passengers.

NORFOLK, VA.—In consequence of the narrow escape of a citizen from injury by a bill-board blown down during a storm, City Attorney Duncan has been asked, and has rendered an opinion that the city is liable should anyone be injured by the falling of a bill-board erected on any thoroughfare. Accordingly the Board of Control will ask Council to pass an ordinance prohibiting the erection of bill-boards without the permit of the board, and authorizing the latter to prescribe such rules and regulations as it deems best, as well as to require the owners to give bond to indemnify the city.

OAKLAND, CAL.—A carload of street signs has been received by the Street Department—1,000 signs in all. While this number is insufficient to mark all the streets, it is a great improvement on present conditions, where signs erected by street car and real estate companies are the only ones visible. The car which brought these signs was placarded the whole length of the car "Street Signs for Oakland, California," so that the city got a grand advertisement.

SEATTLE, WASH.—Charges that several Seattle theaters are inadequately supplied with fire escapes and emergency exits will be investigated by the Committee on City Affairs of the Chamber of Commerce. The investigation will be made as the result of charges made at a recent meeting of the Chamber of Commerce that the Iroquois disaster would be repeated if fire should break out in several Seattle play houses. Judge R. A. Ballinger is Chairman of the Committee.

YORK, PA.—A crusade to remove all signs and advertisements from telephone and electric-light poles throughout the city has been started by Highway Commissioner Heckert. In the course of a single morning twenty-five such signs were removed from poles about the center of the city. The occasion of the raid was the expiration of a ten-days' notice that had been served on the owners of the signs. Hereafter a fine of ten dollars will be collected for violations of the ordinance, the judges and officials, as well as citizens generally, being in accord with the movement.

REVIEW OF THE PERIODICALS

Abstracts and Synopses of the Most Important Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading United States Periodicals and a Few Others

Road Tarring in England

THE Beckenham Council engineer says, "referring to the recent tar-spraying experiments there, that they appear to have been successful. About 1,000 yards were tar-sprayed in a quarter of an hour by a couple of men, and he is of opinion that the whole of the roads in the district—forty-eight miles in extent—could be twice coated in about twenty working days of ten hours each at a cost of £20 (\$100) per mile." Comments of other engineers also are given by an article in the *Municipal Journal* (London) for January 4.

Sterilizing Sewage Effluents

QUITE a little attention has recently been paid in England to the question of sterilizing sewage effluents to destroy the pathogenic bacteria. W. P. Digby and H. C. H. Shenton, in a paper recently read before the Society of Engineers, and reproduced in the *Contract Journal* for January 16 and 23, call attention to the late declaration of the Royal Commission that not only must sewage be kept from tidal waters where oysters or other shellfish live, but that effluents bacterially impure must be excluded also. This practically calls for sterilization of effluents, unless the regular treatment of the sewage effects this. Sterilizing processes should be of low cost of installation, of small expense for material and labor in application, non-poisonous, even in excess, and easily adjusted to varying conditions. The authors treat at length of hydrochlorite solutions for this purpose, and the electrolytic production of sodium hypochlorite; describing patented processes therefor.

New York's Great Water Plans

OF the magnitude of New York's water undertaking, in the plan to tap the reserves of the Catskills for the city, there is very little popular apprehension. It is going to cost, says Frederick Todd in the *Van Norden Magazine* for January, more than the Panama Canal, and as an engineering feat is fairly comparable to it. Some claim that it is a greater task. Yet of the Panama Canal the press is full; for it is national, and has interesting international phases. But among municipalities this work, which the City of New York has undertaken, and which, through its Board of Water Supply, has commenced with a splendid rush, with inspiring thoroughness and with freedom from political interference, is quite as valuable a study. Mr. Todd's article, though popularly written, is broad in its grasp and thorough in its discussion within non-technical limits. It is pleasantly readable, and the illustrations that accompany the article really illustrate it.

Lighting a Town of 500 Inhabitants

ORDINARILY an electric-lighting plant for such a small place would hardly be profitable, but in this case a summer colony of New York business men at Ridgefield, Conn., were willing to pay for the convenience, and a very complete plant was constructed by a company organized among themselves. It contains two 125-horsepower boilers; two high-speed engines, one 65 and one 120-horsepower; and two Westinghouse 2300-volt, sixty-cycle, three-phase generators of 50 and 75 kilowatts capacity respectively. The whole is described at length in the *Electrical Review* for December 29.

Valuation of Municipal Securities

IN making investments in municipal bonds, according to Harry E. Weil (*The Financier*, December 31), "preference is usually given to a locality of long standing. The investor cares very little for the 'never' sections. . . . Strange as it may appear, the majority of securities issued by Southern municipalities are also considered with less favor than those emanating from the North." But, "considering the great amount of capital now being invested in the South, and with a satisfactory adjustment of the race question, Southern municipal securities should, within the course of a very few years, rank in market value to those of any other community. The true financial condition of a municipality is determined in the following manner: First, ascertaining the proportion of assessment of the property of the community as against its real value. Second, the size of its tax duplicate. Third, total amount of indebtedness and of what it consists. If part of this indebtedness is created for special assessment purposes, or the building of waterworks, electric light plants or school houses, so that the actual net indebtedness (securities issued for improvements which could practically not be realized upon after they are made, such as sewers and streets), is not too large, say not over eight per cent. of the assessed valuation, is usually regarded as good financial condition and will add considerably to the price which the intending purchaser will pay for the security. To this may be added that very often the constitution of a state prohibits a larger gross indebtedness than five to ten per cent. of the assessed valuation. When this is the case it also adds to the value of the security." Population and growth, administration from a political standpoint, and municipal ownership are all considered also.

Effect of Leaking Gas Upon Trees

"THE injurious effect of escaping gas upon trees is a subject that has not received the attention it merits, in spite of the fact that there must be thousands of trees

either injured or killed in this country every year by that means." *The Surveyor* thus calls attention to what it considers a serious matter, and further states that "in severe cases of gas poisoning, such as take place where there is a large leak, effects on a tree are very pronounced, and where a tree has once been thus injured there is no hope of recovery. . . . Trees affected with illuminating gas are very susceptible to rapid disintegration." One of the first effects in summer would be a yellowing and drying up of the foliage. The trunk generally, but not always, presents a darkened color, showing absence of life. Certain characteristic fungi make their appearance much sooner on trees affected by gas than on those dying from other causes.

Control of Town Extensions

THEY do some things better in Germany, and among these is the governmental control of street location. Private owners must subdivide their land as directed by the municipal authorities; which practice is so carried out as to result in the absence of narrow, cheerless streets. "The local police authority can demand the fixing of such lines, if this be needed for police reasons, of which the police authority is to judge. A few years ago the municipal authority of Dusseldorf published a plan for an area of nine square miles." Control is exercised over the location of playgrounds, parks, etc.; the height of buildings in the several districts, and the nature of the business or manufacture to be carried on in each. All this and much more of interest is described in a paper by T. C. Horsfall before the Incorporated Association of Municipal and County Engineers, and given in full in *Engineering News* for December 21.

Reclaiming Springfield's River Front

IT is a feather, to which hardly sufficient attention has been called, in the much beplumed hat of Springfield, Mass., that when Mr. Carnegie made his gift for a new library building he omitted the usual conditions. Springfield has so proved its public spirit in many undertakings that he exempted it—as far as we know alone among cities—from promises. A new and very thrilling evidence of this Springfield spirit is afforded by the movement to reclaim the river front. In this the developments have come swiftly in the last few weeks. Two articles on the subject are in this month's index, and doubtless there will be others in later months. Of the January articles, that in *Charities*, with its figures and chronicle of realizations, well supplements that in *The Arena*, which describes the basic conditions and the hope and faith. The story when complete is going to add a proud chapter to American municipal history.

British Cities Excelled by American

FREDERIC C. HOWE's discussion on "The American and the British City" in *Scribner's* for January is an interestingly optimistic comparison that makes cheerful reading for Americans. This is a novel position considering his theme, for we have learned humbly to accept Mr.

Bryce's dicta that in our cities democracy most reveals inefficiency and that there corruption is at its worst. Over against this we have put the belief that English town councils are uniformly honest, and the executive officers not only highly trained, but public spirited and self-sacrificing. Mr. Howe admits all this, and yet he champions our cities and towns. Most largely he bases his hope on the facts that we lay our taxes on property, not on rents, and that the suffrage is not confined to property owners. To him these are fundamental considerations. They explain why our democracy is "more generous, more hospitable to new ideas, more ready to be liberal with its parks, its schools, its libraries, its poor." The American ideal, insofar as there is one, he thinks, "is to make the city helpful. The English ideal is to make its helpfulness pay its way by some means, or at least to be very careful of the tax rate." He interestingly finds the same thing true in regard to a demand for municipal beauty, and notes the contrast to America. He says: "As a rule, the cities of Great Britain have been very indifferent to adornment. They reflect the fear of the rate-payer. The city is unwilling to commemorate itself in a beautiful way. It is tyrannized over by the taxpayer. . . . The American city, however, gives promise of being beautified in the next generation far beyond present indications. It is along these lines that our cities will first attain municipal consciousness. . . . The time is not far distant when our cities will study beauty just as do the German cities." It is the English method of taxing, too, that most encourages slum conditions and makes them so hard to overcome. There, "so long as land is vacant it pays no taxes at all. If it is badly improved it pays but little." With us city land, taxed at its capital value, must be improved or sold. One cannot afford to leave a shack where an office building should be erected. In consequence rebuilding and improvement constantly go forward.

Town Improvement

THE best magazine article on village and town improvement that has been printed for a long time is that by Ernest C. Peixotto, in *Appleton's* for January. The trouble with most articles of this sort is that in attempt to be comprehensive they are vague as a whole, and that usually the author is so carried away by some particular thought or aspect of his subject that he enlarges on that, to the loss of all due proportion. In the article in *Appleton's* the balance is perfectly preserved, the grasp is comprehensive, the examples drawn from Europe and America are pertinent, and the article is concretely suggestive. Those concerned with the more esthetic phases of town improvement will find it, considering its brevity, remarkably refreshing, helpful and inspiring. The reviewer, having said so much in praise, regrets that he has to register a dissent from the final paragraph. In this, Mr. Peixotto preaches against the lawn that is open to the street. He seems for a moment to forget that his subject is the improvement of the aspect, not of gardens, but of the town.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Periodicals Listed Below

- Acetylene Journal, Chicago.
 Ainsley's Magazine, New York.
 American Academy of Political and Social Science, Annals, Philadelphia.
 American Architect, New York.
 American Banker, New York.
 American Gas Light Journal, New York.
 American Homes and Gardens, New York.
 American Institute of Architects, Bulletin, New York.
 American Institute of Electrical Engineers, New York.
 American Magazine, New York.
 American Society of Civil Engineers, Proceedings, New York.
 Appleton's Magazine, New York.
 Architects' and Builders' Journal, Baltimore.
 Architects' and Builders' Magazine, New York.
 Architectural Record, New York.
 Architectural Review, Boston.
 Arena, Trenton.
 Associated Engineering Societies, Journal, Boston.
 Atlantic Monthly, Boston.
 Bohemian, Deposit, N. Y.
 Brick, Chicago.
 Broadway Magazine, New York.
 Canadian Municipal Journal, Montreal.
 Cement, New York.
 Cement Age, New York.
 Century, New York.
 Charities, New York.
 Clay Record, Chicago.
 Clay Worker, Indianapolis.
 Colliers Weekly, New York.
 Construction News, New York.
 Consular Reports, Washington.
 Contract Journal, London.
 Cosmopolitan, New York.
 Country Life in America, New York.
 Craftsman, New York.
 Department of Labor, Bulletin, Washington.
 Eclectic Magazine, New York.
 Electrical Railway Review, Chicago.
 Electrical Review, New York.
 Electrical World, New York.
 Engineer, Chicago.
 Engineer, London.
 Engineering-Contracting, New York.
 Engineering and Mining Journal, New York.
 Engineering Magazine, New York.
 Engineering News, New York.
 Engineering Record, New York.
 Engineering Review, New York.
 Engineering Soc'y of West. Penn., Pittsburg.
 Engineering World, Chicago.
 Engineers' Club, Proceedings, Philadelphia.
 Everybody's Magazine, New York.
 Far Eastern Review, Manila.
 Financier, New York.
 Fire and Water, New York.
 Fireman's Herald, New York.
 Forum, New York.
 Franklin Institute Journal, Philadelphia.
 Gardenjng.
 Gesundheits Ingenieur, Munich.
 Good Roads, New York.
 Harper's Monthly, New York.
 Harper's Weekly, New York.
 House and Garden, Philadelphia.
 House Beautiful, Chicago.
 Illuminating Engineer, New York.
 Independent, New York.
 Indian and Eastern Engineer, Calcutta.
 Insurance Engineering, New York.
 Iron Age, New York.
 Lippincott's, Philadelphia.
 Literary Digest, New York.
 Local Government Journal, London.
 McClure's Magazine, New York.
 Manufacturers' Record, Baltimore.
 Metropolitan Magazine, New York.
 Municipal Engineering, Indianapolis.
 Municipal Journal, London.
 Municipal Journal and Engineer, New York.
 Municipal World, St. Thomas, Ont.
 Munsey's Magazine, New York.
 Moody's Magazine, New York.
 New England Magazine, Boston.
 New England Water Works Ass'n, Journal, Boston.
 North American Review, New York.
 Outing Magazine, Deposit, N. Y.
 Outlook, New York.
 Pacific Monthly, Portland, Ore.
 Pacific Municipalities, Santa Clara, Cal.
 Park and Cemetery, Chicago.
 Pearson's Magazine, New York.
 Political Science Quarterly, Boston.
 Popular Science Monthly, New York.
 Preventive Medicine Journal, London.
 Progressive Age, New York.
 Public Health, London.
 Public Service, Chicago.
 Putnam's Magazine, New York.
 Reader, Indianapolis.
 Review of Reviews, New York.
 Revista Municipal, Havana.
 Rock Products, Louisville.
 Sanitary Institute Journal, London.
 Saturday Evening Post, Philadelphia.
 Scientific American, New York.
 Scribner's Magazine, New York.
 Street Railway Journal, New York.
 Suburban Life, Boston.
 Success, New York.
 Sunset, San Francisco.
 Surveyor, London.
 Technique Sanitaire, Paris.
 Tradesman, Chattanooga.
 Travel Magazine, New York.
 Van Norden's Magazine, New York.
 Village, Hyde Park, Mass.
 Water, London.
 Water and Gas Review, New York.
 World Today, Chicago.
 Western Municipal News, Winnipeg.
 World's Work, New York.

ROADS AND PAVEMENTS

Paving.—Sheet Asphalt Pavement Specifications, of the District of Columbia. Quoted in full, 2½ pp. Cement and Engineering News, December.

Asphalt Paving in 1906. Data concerning the amounts done in cities of different sizes. Clifford Richardson. ¾ p. Municipal Journal and Engineer, January 23.

Brick, Paving, Manufactured in the United States in 1905. Statistics by States, giving numbers and value. ½ p. Municipal Journal and Engineer, January 30.

Heaving of Wood Block Paving between rails; cause and prevention in Boston. ½ p. Municipal Journal and Engineer, January 9.

History and Development of Wood Block Paving. From paper before Boston Society of Civil Engineers by F. A. Kummer. 1 1-4 pp. Engineering Record, January 12.

Chert Roads in Alabama. Character of material and method of construction. Abstract of paper before American Society of Municipal Improvement by Edgar B. Kay. Illustrated. 1 1-3 pp. Municipal Journal and Engineer, January 2.

Baltimore Pavements. The different kinds recommended by City Engineer Fendall. 1-3 p. Municipal Journal and Engineer, January 23.

Foreign Paving. Comments on recent observations in Europe, reported to City of Baltimore by B. T. Fendall. 2 pp. Engineering Record, January 19.

Materials for Paving used in the Southern States, and amounts, in 1906. Quantities given for the principal cities. 3-4 p. The Tradesman, January 15.

Maintenance and Repair.—English methods of. Extracts from engineer's report to Eaton District Council, England. 1 p. Park and Cemetery, January.

Repaving Over Excavations. Describes how certain cities do such work themselves. 1 p. Municipal Journal and Engineer, January 9. Practice just adopted by Brooklyn, N. Y., of doing this work by the city. 1 p. Municipal Journal and Engineer, January 30.

Tar Spraying of Roads.—To be tested in England by the Roads Association and Automobile Club. ½ p. Contract Journal, December 19.

Tar-Spreading Machines. Rules of a contest between such machines in England, with explanatory notes. 1 p. Contract Journal, January 9.

Tar in Macadam Roads. A new method of using it suggested by an English engineer. "Highway Maintenance and Repair." Arthur Gladwell. 2-3 p. Contract Journal, January 2.

Alleys.—The attempt to improve conditions of those in the National Capital. Editorial. ¼ p. Charities and the Commons, January 5.

Sidewalks.—Concrete Sidewalks. Discussion on material, joints, etc., at convention of National Association of Cement Users. 1-3 p. Engineering News, January 17.

Cement Sidewalk Construction. Two recent specifications for these presented to National Association of Cement Users. 1 p. Engineering-Contracting, January 23.

Cement Walks in Canada. Form of ordinance, method of construction, etc., briefly described. Paper before the Union of Manitoba Municipalities. W. M. Shillinglaw. 2 pp. Canadian Municipal Journal, December.

Tar Sidewalks. Discussion in favor of. ½ p. Municipal Journal and Engineer, January 2.

Curb and Gutter.—Method and cost of constructing these of concrete in Ottawa.

1 p. Municipal Journal and Engineer, January 16.

Track Construction.—Present practice in paved streets outlined. I. E. Matthews. 1½ pp. Concrete stringers in Buffalo. Illustrated. 2½ pp. F. D. Jackson. Tie plates. E. P. Roundey. Electric Welding. P. Ney Wilson. Rail bonds. H. L. Mack. Papers before Street Railway Association of New York. Street Railway Journal, January 19.

SEWERAGE AND SANITATION

Sewerage Systems.—Concrete Sewer in Pittsburg, Pa. Illustrated description of construction of 5-foot sewer. 1 p. Rock Products, December 22.

New Orleans Sewerage, Drainage and Water Works Systems. A brief history of them. George G. Earl. 1½ pp. Municipal Engineering, January.

Sewerage of Johannesburg. Description of the design, which is now under construction. Map, detail, plans, etc. D. C. Leitch and G. S. Burt Andrews. 6 pp. Contract Journal, January 9; 6 pp. January 16. 1 p. Engineering Record, January 12.

Cost of Constructing Egg Shaped Sewer. Given in terms of labor and material, for a small sewer in Springfield. 1-3 p. Engineering-Contracting, January 16.

Cost of Sewer Work in South Bend, Ind., and Pawtucket, R. I. Data briefly stated. ½ p. Municipal Journal and Engineer, January 9.

Sewage Pumping Plants.—Description of several small plants before Boston Society of Civil Engineers. Abstract. ½ p. Engineering News, January 17.

Sewage Pumping Plant of Baltimore. Technical description. Illustrated. 4 pp. Engineering World, December 28.

Sewer Designing.—Rainfall Rates in Sewer Designing. Necessity of designing inlets for high rates. ¾ p. Municipal Journal and Engineer, January 30.

Sewerage for Villages. By Arthur N. French. 3 pp. Illustrated. The Village, January.

Sewage Treatment.—Land Treatment of Sewage. Full treatise on the subject. Concluded. Herbert T. Scoble. 4 pp. The Surveyor, December 28.

Individual Septic Tanks. History and description of a design of the author. "Sewage Disposal Without Sewers." Burton J. Ashley. Engineering World, January 11.

Sterilization of Sewage. Filter Effluents. Editorial comment and abstract of paper in Technology Quarterly by Earle B. Phelps and William T. Carpenter. 2¼ pp. Engineering Record, January 19.

Disinfection of Waste Water, with special consideration of its subsequent biological purification. Dr. L. Schwarz. Gesundheits-Ingenieur, December 22. 12½ pp.

Typhoid Epidemics.—Discusses possibility of other causes than polluted water. Editorial. 1 p. Municipal Journal and Engineer, January 9.

Typhoid Fever at Kenton, O. Investigation last year by State Board of Health, and conclusions reached. 5½ pp. Ohio Sanitary Bulletin, December.

Typhoid Fever at Youngstown, O. Report on an epidemic prevailing in spite of excellent filtration. By Paul Hensen, for Ohio State Board of Health. 1 p. Engineering News, January 10.

Typhoid Fever Diagnosis. Value of the Widal reaction for this purpose, from a physician's standpoint. 2 pp. Public Health, January.

Polluted Water.—Subsoil Water in India, possibly a source of enteric fever, cholera, etc. Relation of geological formation to pollution. A. Willan Dawson. 5½ pp. Journal Royal Inst. of Public Health, January.

Bacterial Contamination of Streams and Oyster Beds. The danger stated and methods of sterilizing described. W. Pollard Digby and H. C. H. Shenton. 2 pp. Contract Journal, January 16.

Sanitation.—"Sanitary Engineering in 1906." Review of sewerage and sewage disposal work done in England and a few foreign cities. A mere outline. 2-3 p. The Engineer (London), January 4.

Municipal Sanitation in the Panama Canal Zone. Part of the report of Gov. Magoon, describing fully and tersely the work done. 2-3 p. Engineering World, December 21.

Plumbing.—Traps and Back Venting. Re-sealing and Anti-siphon Traps considered. H. J. Luff. 1½ pp. Engineering Review, January.

Plumbing Inspector and Police Power. Relation between them. Paper before Am. Soc. of Inspectors of Plumbing and San. Eng. N. D. Baker. 1½ pp. Engineering Review, January.

Plumbing Inspectors and Sanitation. Relation between the two. Paper before Am. Soc. of Inspectors of Plumbing and San. Eng. Martin Friedrich. 1 p. Engineering Review, January.

Plumbing Inspectors and Other City Officials. Relation between them. Paper before Am. Soc. of Inspectors of Plumbing and San. Eng. Chas. B. Ball. 1 p. Engineering News, January 24. Engineering Review, January.

Smoke and Soot Intensities.—Estimating by means of the Aitken Dust Detector the amounts of these in city atmospheres. Dr. Gemund. 6½ pp. Gesundheits-Ingenieur, January 12.

WATERWORKS

Description of System.—"New York's Great Water Plans." By Frederick Todd. 17 pp. Illustrated. Van Norden Magazine, January.

Boulder, Col., Water Supply. Brief description of supply from a glacier. Illustrated. 1 p. Municipal Journal and Engineer, January 16.

Waterworks System of Ilion, N. Y. Brief illustrated description, cost, etc. 3 pp. Fire and Water, January 19.

Proposed Water Supply of Los Angeles. Report of the engineer on the proposed 226-mile aqueduct. Illustrated. 4½ pp. Engineering News, January 24.

Improvements in the Water Works of Spokane, Wash. Brief statement of work recently completed. J. T. Fanning, 2-3 p. Fire and Water, January 12.

Pumping Station of Buffalo Water Works. Illustrated description of 212,000,000-gallon plant. Richard C. Williams. 4 pp. Engineer, January 15.

Standpipe of Reinforced Concrete at Waltham, Mass. Description. Illustrated. 1 p. Municipal Journal and Engineer, January 2. 2 pp. Engineering Record, January 12.

Collecting, Storing and Distributing Water for small systems. Paper before Ass'n of Engineers-in-Charge (England). General discussion from engineering point of view. H. C. H. Shenton. 6 pp. The Surveyor, January 4 and 11.

Waterworks in 1906.—Review of more important work done in English and a few foreign cities. 1 p. The Engineer (London), January 4.

Water Purification.—Some observations on. Paper before Am. Ass'n for

Advancement of Science. P. A. Maignen. 3 pp. Water and Gas Review, January.

Sulphate of Copper in Filtration. Paper before British Ass'n of Water Works Engineers. Concluded. Adolphe Kemna. 1¼ pp. Contract Journal, December 19.

"Filtration, the Use of Sulphate of Copper in." Paper referring to Bulletin of the U. S. Bureau of Plant Industry, and the author's experience at Antwerp. Dr. Adolphe Kemna. 4½ pp. Water, December 15. 3 pp. Engineering News, January 17.

Copper Sulphate Treatment of Reservoirs. Experience at Newport, England. J. Howard Jones. 2 pp. Public Health, January.

Artificial Biological Filters. Paper giving result of experiments. 7 pp. Gesundheits-Ingenieur, January 12.

Filtration Plant at Pittsburg. Description in detail. Illustrated. Continued. 5 pp. Engineering Record, December 29.

Mechanical Filters. Illustrated brief description of some English filters. 2 pp. Water, January 15.

Water Analyses.—Interfiltration. Translation of article by M. Ed. Bonjean in Technique Sanitaire. 1 p. Water, January 15.

Biology of Potable Waters. Discussion in Annales de la Societe Zoologique et Malacologique de Belgique. Ad. Kemna. 6½ pp. Technique Sanitaire, December and January.

Pollution of Water Supplies by Railways.—With special reference to the watershed of Seattle, Wash. William T. Sedgwick. 60 pp. Journal New England Water Works Ass'n, December. Abstracted (2 pp.) in Engineering News, December 27.

Meters.—The question of, reported upon by the Commissioners of the Dist. of Columbia. ½ p. Water and Gas Review, January.

Using Water Through Unmetered Pipes, when meters are required, illegal. Abstract of recent decision. 1 p. Water and Gas Review, January.

Water Waste. Causes and Methods of Prevention described. Paper before Ass'n of Water Engineers. Ralph Blakiston. 1½ pp. The Surveyor, December 28. Illustrated. 2 pp. Contract Journal, December 19.

Water Meter Tests in France. Criticism of Government tests made in 1905. Clemens Herschel. ½ p. Engineering News, January 3.

Metering Municipal Supplies Advocated. Paper before Union of British Columbia Municipalities. C. L. Wain. 1 p. Canadian Municipal Journal, January.

Pumping.—Air Lift Pumping at Jameco, L. I. Brief statement concerning condition and results. ½ p. Compressed Air, January.

"Wind Engine for Pumping." Description of various styles, with discussion of location, attendance, performance, etc. George Phelps. 2 pp. Contract Journal, January 2.

Reservoirs.—Leaking Reservoirs Made Tight. Describes a puddled reservoir over a coal mine, and how it was made water tight. Illustrated. 3 pp. Water, January 15.

Reservoir Sites. Advisability of stripping top soil from them discussed in report by Hazen and Fuller, who advise against it. 3½ pp. Engineering News, January 3.

Submerged Water Main.—Description of use of ball and socket joint for this in

England. "Laying a Submerged Water Main in the River South Esk." Herbert Hall. 1 p. Contract Journal, January 2.

Maintenance of Water Supplies.—At the source, in storage, filtration and distribution. Brief and general. Alfred D. Price. 6 pp. Journal Royal Inst. of Public Health, January.

"Rural Water Supplies."—Incompetency of the English laws to secure improvement in quality of rural supplies. John C. Thresh. 2½ pp. (continued). Water, December 15 and January 15.

Underground Waters.—Fluorescein used to trace the motion of such waters. Theory and practical illustrations. 1¼ pp. Engineering Record, December 29.

Examination Questions.—Examination held December 4 for Chief of Bureau of Water, Philadelphia. 1 p. Engineering News, January 3.

STREET LIGHTING AND ELECTRIC POWER

Electric Lamps.—Developments in them during 1906. Review of progress. Clayton H. Sharp. 33pp. Proceedings American Institute of Electrical Engineers, December. Abstract, 1 1-4 pp. Electrical Review, January 12.

Incandescent Lamps. New types of. Paper before American Institute of Electrical Engineers. Clayton H. Sharp. 13 pp. Illuminating Engineer, December.

New Methods of Electric Lighting, briefly described in a paper before the American Institute of Electrical Engineers by C. P. Steinmetz and C. H. Sharp. 2½ pp. Engineering Magazine, January.

Street Lights in New York. Striking illustrations, with accompanying descriptions of brilliantly lighted centers. Edward S. Martin. 9 pp. Harper's Magazine, February.

Electric Signs.—Advocating their use, and suggesting ordinance provisions. Wm. Goltz. 3-4 p. American Gas Light Journal, December 31.

Municipal Electric Lighting Plant.—Description of the plant at Ridgefield, Conn. Illustrated. 2½ pp. Electrical Review, December 29.

Municipal electric lighting plants at Muncie, Holyoke, Bay City and elsewhere. Reports presented from the viewpoint of anti-municipal ownership. 5 pp. Public Service, January.

Incandescent Gas Lighting.—Notes concerning, from paper before S. Dist. Jr., Gas Association, London. L. F. Tooth. 1 p. Progressive Age, January 15.

Incandescent Gas Mantles. Suggestions for standard specifications for them. Van Rensselaer Lansingh. 3 pp. American Gas Light Journal, December 31.

Gas Mains.—Construction and Maintenance. Practical "wrinkles," presented at the annual meeting of the American Gas Institute. Illustrated. 6 pp. American Gas Light Journal, January 14. Progressive Age, January 15.

Gas Supply in 1906.—Review of progress in the manufacture and use of gas in England. ½ p. The Engineer (London), January 4.

Gas Destroys Trees.—Injurious effects in England of gas escaping from mains. ½ p. The Surveyor, December 28.

Street Lighting.—Review of progress during 1906. Alton D. Adams. 2 pp. Municipal Journal and Engineer, January 2.

GOVERNMENT AND FINANCE

Municipal Ownership.—As a Form of Governmental Control. Full discussion, concluding that present municipal methods should first be revised. F. A. Cleveland. 12 pp. Annals American Academy Political and Social Science, November.

Municipal Ownership and Private Management Compared; conclusion reached that the latter is preferable, if properly safeguarded by the municipality. Chester Lloyd Jones. 14 pp. Annals American Academy Political and Social Science, November.

Municipal Telephones.—Progress in Canada and the United States. Paper before the Union of Manitoba Municipalities. Francis Dagger. 4½ pp. Canadian Municipal Journal, December.

Municipal Government.—"The American and the British City—A Comparison." By Frederic C. Howe. Results, methods and tendencies compared. 8 pp. Scribner's Magazine, January.

"Injecting Posterity Into Politics." Suggestion for a citizens' committee to pass on the acts of retiring officials. By Clinton Rogers Woodruff. 1 p. Charities and the Commons, January 5.

"The Galveston Idea."—An editorial describing the widespread interest in government by commission. 1 p. McClure's Magazine, January.

The Reform Wave in Buffalo.—Improving the police force. Editorial, ¾ p. The Independent, January 10.

"The Liquor Law and Its Administration in Suburban Cities." By Arthur Lyman. Paper read at the fourth Massachusetts State Conference of Charities and Corrections. 4½ pp. Charities and the Commons, January 26.

Education in Citizenship.—"The School City," its purpose and progress. By Ralph Albertson, secretary of the National School City League. 1¼ pp. The Arena, January.

Franchises, Valuation of.—Discussion of relation of cities to private corporations, opportunities offered for corruption, and considerations entering into evaluation. William D. Marks. 2½ pp. Municipal Journal and Engineer, January 2.

Municipal Bonds.—Growth of market for them in recent years. 1 p. American Banker, December 29.

Bond Values.—The effect on these of the physical conditions of a city; what the bond dealer considers before purchasing. Harry E. Weil. 2 pp. The Financier, December 31.

Municipal Accounting in Boston and Louisville.—Boston's system described by Harvey S. Chase, Louisville's by J. W. Baird. 9 pp. Annals American Academy Political and Social Science, November.

Uniform Municipal Accounting advocated for small cities. Paper before Union of British Columbia Municipalities. Graham Rosoman. Canadian Municipal Journal, January.

REFUSE COLLECTION AND DISPOSAL

Refuse Destructor and Lighting Plant Combined.—Report on proposed plant for East Orange, N. J. 1 p. Engineering News, January 24.

Municipal Garbage Furnaces.—Complete list of all such plants constructed in the United States, with data. W. F. Morse, 4¾ pp. Municipal Journal and Engineer, January 2.

FIRE AND POLICE

Steam Jets for Extinguishing Fires.—Report on this subject adopted by National Fire Protective Association. 1 p. Engineering Review, January.

Fire Protection for Villages.—Suggestions as to apparatus. Paper before the Union of Manitoba Municipalities. T. C. Menlove. 1½ pp. Fireman's Herald, December 29. Canadian Municipal Journal, December.

Fireboat Protection in New York City.—Description of the boats and service rendered. Fire and Water, January 12.

High Pressure Fire System.—Very full description of Philadelphia's. Its use by the Fire Department. F. S. Hand. 23 pp. Insurance Engineering, December.

Rubber Tires for Fire Apparatus recommended for Newark, N. J. Reason given. 2-3 p. Fireman's Herald, January 5.

Two Platoon System for Firemen.—Bill presented to Legislature to secure this for Omaha, Neb., with comments. ½ p. Fireman's Herald, January 26.

PARKS AND CITY BEAUTY

"Municipal Art in American Cities."—A brief description of the city of Springfield, Mass., and plans for reclaiming its river front. By George Wharton James. 16½ pp. Illustrated. The Arena, January.

The Springfield River Front Improvement. "A Demonstration of Good Citizenship." By Guy Kirkham. 3 pp. Illustrated. Charities and the Commons, January 5.

"Street Plan for an Ideal Town." Consideration for this in a social colonizing scheme. ½ p. Notes and comments department, Architectural Record, January.

Architecture.—"New Skyscrapers for New York." An account of fifteen buildings planned for lower New York. By Henry Alexander Harwood. 10 pp. Illustrated. Metropolitan Magazine, January.

Beauty in Skyscrapers, as revealed by etchings of Pennell. Reproduction of eight of these, showing an artistic element in New York unsuspected by most of us. Giles Edgerton. 14 pp. The Craftsman, January.

"Modern Towers of Babel in New York." Their height and their safety, with the Singer building as a text. By George Ethelbert Walsh. 1½ pp. Harper's Weekly, January 12.

"The New Grand Central Station (New York) and Its Setting." Three full-page drawings by Vernon Howe Bailey. Harper's Weekly, January 12.

Elevated Railways and Civic Beauty. Considers and compares the structures in Berlin, New York, Boston and Chicago; to the disadvantage of the three last as regards beauty. Illustrated. Ernest C. Moses. 9½ pp. The World Today, February.

Parks.—National Study of. A suggestion of G. A. Parker. ½ p. Notes and Comments department, Architectural Record, January.

"Parks as Money Makers." The experience of Louisville. ¼ p. Notes and Comments department, Architectural Record, January.

"The Park System of Tacoma, Wash." By E. R. Roberts, Superintendent of Parks. 5 pp. Illustrated. Park and Cemetery, January.

"Park Work for 1907." Progress and projects throughout the country. 1½ pp. Park and Cemetery, January.

"Parks for American Villages." 2½ pp. Illustrated. The Village, January.

Playgrounds.—The Washington Playground Association. Editorial paragraph, ¾ p. Charities and the Commons, January 5.

Shade Trees.—Municipal Control of Planting and Care of. Paper read before American Society of Municipal Improvements. By William Solotaroff, secretary Shade Tree Commission of Orange, N. J. 1 p. Park and Cemetery, January.

"Repairing Defective Trees with Cement Filling." By George E. Stone. 2 pp. Illustrated. Park and Cemetery, January.

"Shading the Highways." Suggestions for street tree planting in California, based on the experience of Oakland. By Mary W. Tyrrell, secretary Oakland Society for the Improvement of the Highways. 5 pp. Illustrated. Sunset, January.

Nuisances.—"A Billboard Victory," in Honolulu. ½ p. Notes and Comments department, Architectural Record, January.

Unightly Billboards in Washington: "And This Is at the Nation's Capital." By J. Horace McFarland. 1 p. Illustrated. Ladies' Home Journal, January.

"The Nuisance of Advertising." By Sylvester Baxter. 12 pp. Illustrated. Century, January.

RAPID TRANSIT

Chicago Traction Ordinances.—Statement of the provisions agreed upon, and discussion of some. 1 p. Electric Railway Review, January 12.

Chicago Traction Problem, used as a basis for a study in political evolution. Follows the history from 1865 to the present. Willard E. Hotchkiss. 2 pp. Annals American Academy of Political and Social Science, November.

Street Railway Valuations in Chicago. A comparison of the figures given by the companies and those by the city's engineer. 1½ pp. Street Railway Journal, December 22.

New York Rapid Transit Situation.—Editorial on this most difficult of all transportation problems. 1¼ pp. Street Railway Journal, January 5.

"The Solution of New York's Transportation Problem." ½ p. illustration. Scientific American, December 29.

Transportation Problem of the Bronx, New York. Part 1, The present conditions thoroughly set forth. Illustrated. Street Railway Journal, December 29.

Cleveland Electric Railways. Court decisions concerning. Abstract of decision and statements of parties affected. 1¼ pp. Street Railway Journal, January 12. Later developments. 2 pp. Street Railway Journal, January 5.

London Passenger Transportation. General description of conditions and how met by the use of automobiles. Illustrated. 3 pp. Motor Traffic, December 15.

German Electric Railways. Description of the condition, of these in December, 1906. By a German engineer. 4 pp. Street Railway Journal, January 5.

French Electric Railways. Description of the condition of these in December, 1906. 1¼ pp. Street Railway Journal, January 5.

Philadelphia Rapid Transit Terminal. Illustrated description of building and approaches now under construction. 3½ pp. Electric Railway Review, January 5.

Bad Air in Boston Cars: "A City Grumbling." Editorial, ½ p. Charities and the Commons, January 5.

Tunnels in New York City.—Illus-

trated outline description of four of the tunnels and subways which have been driven. S. D. V. Burr. 9 pp. Iron Age, January 10.

Tunnels of New York City. Popular description of the fourteen which are soon to be in service. Charles H. Cochran. 8½ pp. Moody's Magazine, December.

"Present Condition of the New York Tunnels." Editorial, 1-3 p. Scientific American, December 29.

"The Cortlandt Street Tunnels and Terminal Building, New York." 2 pp. Illustrated. Scientific American, January 26.

New York Subways. Comment on the contracts about to be let. 1¼ pp. The Outlook, December 29.

Rapid Transit Rolling Stock. Suggested improvements in modern practice. Continued. 7 pp. Street Railway Journal, January 5.

T Rails in City Streets. Attempt to abolish them in Columbus discussed. ½ p. Electric Railway Review, January 5.

MISCELLANEOUS

Civic Improvement.—Various Notes on. 3 pp. Civic Improvement department, Charities and the Commons, January 19.

Various Notes on. The Village, January.

What Greenfield, Mass., Is Accomplishing: "A Community Awake." By Edward T. Hartman. 1 p. Illustrated. Suburban Betterment department, Suburban Life, January.

"The Famous Town Room in Boston." 3 pp. Illustrated. The Village, January.

"The Public Value of the Private Garden." ½ p. American Homes and Gardens, January.

"The Civic Awakening." News Notes. 1 p. Park and Cemetery, January.

Civic Associations. What they accomplish. General article. Clinton Rogers Woodruff. 2 pp. The Financier, December 31.

Descriptions of Cities.—"Prince Rupert, a Metropolis of To-morrow." An account of the site of the Pacific terminal city planned by the Grand Trunk Pacific Railway. By John Nelson. 2½ pp. Illustrated. The World To-Day, January.

Pittsburg. Its lack of civic improvements, its fine suburbs, its history: "The Romance of Steel and Iron in America." Part X Pittsburg, continued. By Herbert N. Casson. 12 pp. Munsey's, January.

"Emporia and New York" in social contrast. By William Allen White. 7 pp. American Magazine, January.

Ottawa. A pleasantly rambling description of impressions. 4 pp. "Editor's Study," Harper's Magazine, January.

"The Town of Hopedale." By Roger DeLand French. 4 pp. Illustrated. The Village, January.

Buenos Ayres. General description of the city. Illustrated. Sylvester Baxter. 13 pp. The Outlook, January 26.

Escanaba, Mich. Statement concerning the various municipal departments and utilities. 1¼ pp. Municipal Journal and Engineer, January 9.

"Belfast, the Chicago of Ireland." By Sydney Brooks. 2 pp. Illustrated. Harper's Weekly, January 12.

Montevideo. Described in "The South American Situation—IV. Uruguay." By Albert Hale. 14 pp. Illustrated. The Reader, January.

Reconstruction of Manila. Work done up to June, 1906 by the Municipal Board; sewers, waterworks, bridges, etc. From Report of Bd. of Pub. Works. Illus-

trated. 9 pp. Far Eastern Review, December.

Housing.—The Poor, and Economy in Tenements. 1 p. Notes and Comments department, Architectural Record, January.

"The Housing Problem in San Francisco." By Edward T. Devine. 13 pp. Popular Science Quarterly, December.

Revision of the Building Code in Washington, with special reference to tenements. Editorial paragraph, ½ p. Charities and the Commons, January 5.

"Increased Tenement Rents." Extracts from the annual report of the New York Charity Organization Society. 1 p. Charities and the Commons, January 19.

Public Buildings.—"Housing New York City's Public Servants." The comparative meanness of most of New York's public buildings. 1 p. Notes and Comments department, Architectural Record, January.

"The New Hall of Records." A very friendly description. 13 pp. Illustrated. Architects and Builders' Magazine, January.

Pennsylvania State Capitol. Description and consideration of the question of graft in its construction. Illustrated. Harold F. Howland. 19 pp. The Outlook, January 26.

Markets and Abattoirs.—Bibliography of Market Houses. Reprint from Durin's "Handbuch der Architektur." 1 p. American Architect and Building News, Jan. 12. Abattoir at Harborough, England. Plans and dimensions. 1 p. Local Government Officer, December 29.

Meat Inspection. Licensing dealers to sell inferior meat, and strict supervision of slaughtering in Germany. English and American practice. A. J. Gregory. ½ p. Local Government Officer, January 19.

The Slums, the Cry of the. Five pictures by Bessie Marsh and comment by Charles Edward Russell. 7 pp. Everybody's, January.

Suburban Life.—What It Means to Me. By Hon. John D. Long. 2 1-3 pp. Illustrated. Suburban Life, January.

Street Planning.—Its effect upon land values illustrated by New York statistics. Nelson P. Lewis. 1 p. Municipal Journal and Engineer, January 23.

Municipal Improvements in California Cities. Data concerning thirty-five cities for the year 1906. Pacific Municipalities, November.

Municipal Work done during 1905-06. Report of committee on review of American Society of Municipal Improvements. 1¾ pp. Municipal Journal and Engineer, January 2.

Municipal Construction Work during 1906. Review of work done in paving, sewers and water works. ¾ p. Municipal Journal and Engineer, January 2.

Discomforts of New York.—Congested transportation, noises and torn-up streets commented upon. 1¼ pp. The Outlook, January 5.

Clean Milk.—How legislation and inspection secure it for New York citizens. John E. Sayles. 7 pp. Charities and the Commons, January 12.

Milk Dilution. Method of detecting addition of water. 4 pp. Cecil Revis. Journal of Royal Inst. of Public Health, January.

Subway for Electric Cables. Illustrated description of one constructed at Aberdeen, Scotland. 1 p. Engineering Record, January 26.

Snow Removal. Descriptions of methods employed in English cities. 1¼ pp. The Surveyor, January 18.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Buildings, Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Street Improvements				
New York	Brooklyn	February 6	Asphalt paving, grading, sidewalks, etc.	Bird S. Coler, Boro. Pres.
Indiana	Brazil	February 7, 10 A.M.	Constructing 11,910 ft. gravel road, Posey twp.	County Commissioners.
Missouri	Kansas City	February 7, 11 A.M.	Constructing brick, concrete and asphalt pavements, granitoid curb, sidewalks, etc.	E. A. Harper, City Engineer.
Indiana	Brazil	February 7, 11:30 A.M.	Constructing 12,760 ft. gravel road, Sugar Ridge township.	James L. Burns, County Auditor.
Ohio	Cincinnati	February 7, noon	Macadam, curb, gutter, etc., Stanley Ave.	M. J. Keefe, Clk. Bd. Public Service
Ohio	Cincinnati	February 7, noon	Building roadway, etc., Branch City Hosp.	M. J. Keefe, Clk. Bd. Public Service.
Indiana	Vincennes	February 7, 1 P.M.	Grading and macadamizing 41,820 ft. road.	Mack Pogue, County Auditor.
Indiana	Vincennes	February 7, 2 P.M.	Constructing 6,733 feet gravel road	John T. Scott, County Auditor.
Minnesota	St. Paul	February 7	Grading Wyoming Street	R. L. Gorman, Clk. Bd. Pub. Wks.
Texas	Denison	February 7	20,000 sq. yds. vit. brick pavement, Main St.	R. I. Parks, City Engineer.
Missouri	St. Louis	February 8	Improving 52 alleys; estimate, \$1,000,000.	Charles M. Talbert, Engineer, B. P. I.
Wisconsin	West Allis	February 9, noon	Furnishing macadam roller, 10 or 12-ton wt.	L. F. Fish, City Clerk.
Pennsylvania	Williamsport	February 11, noon	Building undergrade crossing, Campbell St.	James P. Fisher, City Engineer.
Illinois	Chicago	February 11	Asphalt and brick pavement, cement sidewalks, County Hospital	Wm. McLaren, Supt. Pub. Serv.
New York	New York	February 11, 3 P.M.	Asphalt and wood-block paving, conc. f'nd'n.	John F. Ahearn, Boro. Pres.
Ohio	Wauseon	February 11	Paving Fulton Street with brick	Charles J. Hodges, Clk. B. P. S.
Texas	Dallas	February 12	Paving portion of Columbia Ave. with bitul'c.	E. L. Dalton, City Engineer.
Indiana	Rensselaer	February 12, noon	System of macadam roads, Carpenter twp.	Jasper County Commissioners.
New Jersey	Bogota	February 12, 8 P.M.	9,200 sq. yds. macadam; 1,050 sq. yds. gutters; 10,500 lin. ft. curb; 10,500 lin. ft. flagwalks; six streets.	Peter F. Hopper, Chm. St. Com.
Indiana	Petersburg	February 12	Constructing 8 miles gravel road	F. R. Bilderback, County Auditor.
New York	Brooklyn	February 13, 10 A.M.	Furnishing sand, cement, curb, etc., 4 asphalt rollers and 12 trucks; also street work.	Bird S. Coler, President.
New Jersey	Camden	February 13, 11 A.M.	Constructing gravel road	J. J. Albertson, County Engineer.
New York	Brooklyn	February 13, 11 A.M.	Regulating, grading, etc., various streets.	Bird S. Coler, President.
Minnesota	Neodesha	February 14, 8 P.M.	Brick pavement and concrete curb	S. H. Hale, Mayor.
Texas	El Paso	February 14	Paving alleys, Dist. 1, cobblestones or mac'm.	George C. Wimberly, City Engineer.
Indiana	Spencer	February 14	Gravel road 24 miles, Morgan township.	Geo. O. Mitten, Co. Auditor.
Tennessee	Tazewell	February 15, 10 P.M.	Grade and macadam co. rds.; approp. \$85,000.	B. F. Hulls, Consulting Engineer.
Indian Territory	Tulsa	February 15	Paving 25 blocks, brick or asphalt.	W. D. Abbott, City Recorder.
Ohio	Cincinnati	February 15	Improving four roads with crushed stone.	Fred Drehs, County Clerk.
Indiana	Greensburg	February 15	Constructing gravel road in Fugit township.	County Commissioners.
Ohio	Steubenville	February 16	Constructing State highway	Sam Huston, Columbus Com'r.
New York	Newburgh	February 18, noon	Paving and improving three streets.	Everett Garrison, City Engineer.
Georgia	Atlanta	February 18, 3 P.M.	Constructing sidewalks and curb during 1907.	R. M. Clayton, City Engineer.
Ohio	Chagrin Falls	February 18	Brick paving, curb, etc., two streets.	H. D. Bishop, Village Clerk.
Ohio	Youngstown	February 18	Constructing State highway	Sam Huston, Columbus, Com'r.
Louisiana	New Orleans	February 19	Constructing small granite-block pavement.	A. C. Belt, Engineer.
Pennsylvania	Nonessen	February 25, noon	Grading, curbing and paving 11,350 sq. yds.	J. F. Irwin, Borough Engineer.
Manitoba	Winnipeg	February 28, noon	Supplying 3,000 to 5,000 tons asphalt for paving; also for constructing movable asphalt plant.	H. N. Rutan, City Engineer.
New York	Corning	February 28, noon	17,705 sq. yds. brick pavement with cement curbs and gutters.	J. T. Hall, Clk. Bd. Pub. Wks.
Oregon	Corvallis	March 1	Improving seven streets.	Street Committee, Council.
Indiana	Goshen	March 4	Laying 10,500 yds. brick pavement and 5,000 ft. curb and gutter.	C. C. Witt, City Engineer.
Indiana	Valparaiso	March 8	Laying cement curb and gutter on 3 streets.	Robert Ewing, City Clerk.
Water Supply				
New York	Brooklyn	February 6, 2 P.M.	Furnishing corporation cocks, laying water mains and removing existing mains, 15 sts.	John H. O'Brien, Com'r.
Ohio	Cincinnati	February 7, noon	Extending water supply, Branch City Hosp.	M. J. Keefe, Clk. Bd. Public Service.
New Jersey	Newark	February 7, 3:30 P.M.	Furnishing coated c. i. water pipe and spec'ls.	G. Sanzenbacher, Supt. and Engr.
New York	Yonkers	February 7, 8 P.M.	Furnishing 1,500 lengths 8-in. c. i. pipe; also boiler plant.	John J. Devitt, Pres. Bd. Water Com.
Illinois	Bloomington	February 8, 2 P.M.	Constructing 8,761 ft. 6 to 18-in. pipe.	E. H. Packard, Clk. Bd. Local Im.
District of Columbia	Washington	February 9, noon	Furnishing cast-iron water-pipe specials.	H. B. F. Macfarland, Commissioner.
Manitoba	St. Boniface	February 11, noon	500 1/2-in. and 500 1/4-in. lead flange corp. cocks.	Cecil Goddard, City Engineer.
Connecticut	Waterbury	February 12	Extending high-pressure service.	Robt. A. Cairns, City Engineer.
New York	New York	February 13, 2 P.M.	Furnishing pipe, fillings, valves, boiler tubes, etc., also hauling and laying water mains.	John H. O'Brien, Commissioner.
Indiana	Fort Wayne	February 14, 2 P.M.	Lining reservoir with reinforced concrete.	Board of Public Works.
Minnesota	Milaca	February 14	Constructing steel water tank and tower.	Duluth Engineering Co., Duluth, Eng.
Illinois	Pinckneyville	February 15, 6 P.M.	Constructing 75,000 gal. steel water tower, extreme height, 120 ft.	W. W. Burk, City Clerk.
Wisconsin	Bruce	February 15	Constructing \$10,000 water system.	The Mayor.
Kansas	Oswego	February 19, 8 P.M.	Steam pumps, boilers, reservoirs and bldgs.	Judge Nelson Case, Chm. Water Com.
Michigan	Mt. Pleasant	February 20, 2 P.M.	Extension to water plant; three bids.	M. Devereaux, Pres. Bd. Pub. Wks.
Iowa	Fort Dodge	February 21, 2 P.M.		
Washington	Seattle	February 26, 10 A.M.	Additions to waterworks, in c. 28 1/2 miles, 60 and 51 1/2 in. pipe, mostly wood stave, miscellaneous pipe, Venturi meters, etc.; also constructing 100,000,000 gal. and 50,000,000 reservoirs; 3 separate bids.	C. B. Bagley, Sec'y Bd. Pub. Wks.
Chihuahua, Mexico	Parra	February 28	300 water meters for first installations.	Junta de Mejoras Materiales.
Manitoba	Winnipeg	March 1, 2:30 P.M.	Water pipes, specials, manholes, valves, etc.	H. N. Rutan, City Engineer.
District of Columbia	Washington	March 2, noon	Furnishing fire hydrants.	H. B. F. Macfarland, Commissioner.
North Dakota	Williston	March 5, 10 A.M.	Excavating 420,000 cu. yds. earth, and constructing pumping station, requiring 120,000 ft. 6-m. lumber, 1,300 cu. yds. concrete, and 10,000 lbs. structural steel.	H. A. Stoors Engineer.
Sewerage				
Missouri	Kansas City	February 7, 11 A.M.	Constructing sewers, Dists. Nos. 4 and 25	E. A. Harper, City Engineer.
Ohio	Cincinnati	February 7, noon	Constructing sewers and drains, Div. 14	M. J. Keefe, Clk. Bd. Pub. Serv.
Ohio	Cincinnati	February 7, noon	New Sewer system for Branch City Hospital.	M. J. Keefe, Clk. Bd. Pub. Serv.
Minnesota	St. Paul	February 7, 2 P.M.	Constructing sewer in four streets.	R. L. Gorman, Clk. Bd. Pub. Wks.
Ohio	St. Paul	February 8	Constructing sewers in certain streets.	E. W. Marvin, Village Clerk.
Missouri	Carthage	February 11	Constructing sewer and laterals, Dist. No. 6.	Wm. Kohlman, City Engineer.
Minnesota	Crookston	February 12	3,705 ft. 9 to 30-in. vit. pipe sewers, manholes, etc.	J. E. Carroll, City Engineer.
Minnesota	Hoopeston	February 12	Constructing sewers in certain streets.	A. M. Childs, City Clerk.
Illinois	Decatur	February 14, 2 P.M.	Constructing Prairie Ave. sewer system and 1,010 ft. 54-in. cement sewer Cantrall St. Dist.	A. B. Alexander, City Engineer.

Sewerage, Continued

West Virginia.....	Charleston.....	February 16, 6 P.M.....	Constructing 7 miles reinforced concrete and brick sewers, 8 to 72 ins.; estimate, \$175,000	E. R. Hood, City Recorder.
Ohio.....	Cincinnati.....	February 17, noon.....	Constructing 1,606 ft. 12 and 15-in. pipe sewers; average cut, 13 1/2 ft.; estimate, \$4,737	C. N. Danenhowe, City Eng'r.
Georgia.....	Atlanta.....	February 18, 3 P.M.....	Constructing sewers, also furnishing vit. pipe, cement, manhole and catch basin covers for work in 1907.	R. M. Clayton, City Engineer.
Illinois.....	Cairo.....	February 19, 10 A.M.....	Constructing 9,699 ft. concrete main sewers, etc.	W. B. Thistlewood, City Eng'r.
Iowa.....	Fort Dodge.....	February 21.....	Constructing drains Nos. 1, 7, 17, 24, and 28.	H. S. Holm, County Au ^d or.
Ohio.....	Ravenna.....	February 28.....	Constructing sanitary sewer system.	W. H. Linton, City Engineer.
South Carolina.....	Orangeburg.....	February 28.....	Constructing 10 miles 8 to 20-inch sanitary sewer, estimate, \$52,488.20.	Edward Hawes, Jr., City Engineer.
Iowa.....	Burlington.....	March 18.....	Constructing sewers in certain streets.	John F. Winters, City Engineer.
Ohio.....	Toledo.....	April 1.....	Constructing sewer system; cost, \$40,000.	F. I. Consaul, City Engineer.

Public Buildings

Ohio.....	Cincinnati.....	February 7, noon.....	Erecting smallpox hosp., tuberculosis ward, laundry and power bldg. and nurses' home, all complete.	M. J. Keefe, Clk. Bd. Public Service.
Ohio.....	Columbus.....	February 7, noon.....	Remodeling Chemistry Bldg., State Univ'ry.	Burns & Pretzinger, Dayton, Archs.
Massachusetts.....	Newton.....	February 8, 3 P.M.....	Heating and ventilating plant school bldg.	Geo. H. Elder, Bldg. Com'r.
New York.....	New Paltz.....	February 9, noon.....	Erecting State Normal School bldg; cost, \$125,000.	G. L. Heins, State Arch., Albany.
Missouri.....	Marshall.....	February 10.....	Erecting high school.	J. H. Felt & Co., Kansas City, Archts.
Missouri.....	Mexico.....	February 10.....	Erecting high school.	J. H. Felt & Co., Kansas City, Archts.
New York.....	New York.....	February 11, 11 A.M.....	Repairs, alterations, etc., three school bldgs.	C. B. J. Snyder, Superintendent.
New Jersey.....	Port Hancock.....	February 11, 3 P.M.....	Building ordinance barracks, Proving Grnd.	Commanding Officer, High'ds P. Q.
Ohio.....	Oxford.....	February 11.....	Erecting bld. complete, Miami University.	Gustave W. Brach, Cincinnati, Arch.
Virginia.....	Norfolk.....	February 12, 10 A.M.....	Heating and ventilating system, Bldg. No. 36.	Commandant, Navy Yard.
Florida.....	Pensacola.....	February 12, noon.....	Erecting City Jail and Police Headquarters.	Ausfield & Blount, Architects.
Michigan.....	Detroit.....	February 12, noon.....	Erecting addition to Central high school.	Wm. J. Lee, Sec'y Bd. Educ.
Minnesota.....	Elbow Lake.....	February 12.....	Erecting \$25,000 school.	Wm. Elliott & Son, St. Paul, Archs.
New York.....	New Brighton, S. I.....	February 13, 10:30 A.M.....	Additions and alterations, two fire houses.	F. J. Lantry, Fire Com'r.
Michigan.....	Adrian.....	February 13, noon.....	Erecting new school; appropriation, \$50,000.	Wm. Stearns, Sec'y Bd. Education.
Florida.....	Pensacola.....	February 13.....	Erecting City Hall.	L. Hilton Green, Chm. Bond Trus.
Minnesota.....	Port Snelling.....	February 14, 11 A.M.....	Constructing quarters and stables.	Capt. A. W. Kimball, Q. M. St. Paul.
Pennsylvania.....	Gettysburg.....	February 14, 11 A.M.....	Constructing brick lodge, Nat. cemetery.	M. Gray Zalinski, Q. M. U. S. Army, Washington, D. C.
Ohio.....	Dayton.....	February 14, noon.....	8-room brick addition to school and auditor.	Peters, Burns & Pretzinger, Archs.
New York.....	Brooklyn.....	February 14, 2 P.M.....	Lighting and imprts., 14th Regt. armory.	George B. McClellan, Mayor.
Virginia.....	Jamestown.....	February 18, 3 P.M.....	Constructing bldg. for Ter-Centennial Com'n.	J. K. Taylor, Washington, D. C.
Oklahoma.....	Anadarko.....	February 19, 2 P.M.....	Erecting 2 brick laundries, Indian school.	John P. Blackmon, U. S. Agent.
Georgia.....	Fort McPherson.....	February 20, 11 A.M.....	Installing electric-light fixtures, 2 bldgs.	Capt. B. B. Buck, Constr. Q. M.
Ohio.....	Cleveland.....	February 20, noon.....	Erecting Industrial bldg., State Hospital.	Dr. A. B. Howard, Superintendent.
Indiana.....	Richmond.....	February 20, noon.....	Erecting dormitory, Earlham College.	R. L. Kelly, President.
Connecticut.....	New London.....	February 20, noon.....	Erecting school, Harbor Dist., cost, \$75,000.	Jas. Sweeney, Architect.
Georgia.....	Milledgeville.....	February 21.....	Erecting brick dormitory bldg; cost, \$27,500.	G. W. Goluche & Co., Atlanta, Archs.
Ohio.....	Portsmouth.....	February 21.....	Erect'g 8-room addition, school; cost, \$27,000.	A. B. Alger & Sons, Archts.
Indiana.....	Petersburg.....	February 21.....	Erecting 2-story brick high school, 88 x 150 ft.	F. J. Schlatter, Evansville, Arch.
Wisconsin.....	Madison.....	February 26, noon.....	Furnishing stone, exterior facing, new Cap't'l	Lew F. Porter, Secy. Com'n.
New York.....	Kingston.....	February 26, 3 P.M.....	Building superstructure and interior work, including heating apparatus, wiring, etc., U. S. Post Office.	J. K. Taylor, Washington, D. C.
New York.....	Fort Hamilton.....	February 28.....	Double set barracks, 8-set officers' quarters, post exchange and gym., and 3 brick bldgs.	Capt. P. C. Hains, Constr. Q. M.
Ohio.....	Delaware.....	March 1.....	Bldg. 38 x 54, cost, \$10,000, for Industrial School for Girls.	Thomas F. Dye, Secretary.
Ohio.....	Cleveland.....	March 10.....	Bldg. Technical high school; cost, \$250,000.	F. S. Barnum, Supt. Bldgs., B. E.
North Dakota.....	University.....	March 12, 10 A.M.....	Library bldg. State Univ'ry, cost, \$60,000.	Patton & Miller, Chicago, Ill., Archs.
Ohio.....	Marion.....	April 1.....	Four-story addition to school; cost, \$10,000.	Geo. B. Christian, Jr., Clerk. Bd. Ed.

Bridges

Louisiana.....	LaFayette.....	February 7.....	Constructing iron draw-bridge.	Police Jury.
Indiana.....	Hammond.....	February 8.....	Building 3 bascule bridges for Chicago, Indiana & Southern Ry. Co.; cost, \$250,000.	W. C. Hotchkiss, Chicago, Gen. Man.
Ohio.....	Warren.....	February 11, 1 P.M.....	Erecting plate girder bridge with reinforced concrete and brick floor, S. Main Street.	Chas. F. Lewis, Cleveland, Eng'r.
Indiana.....	Richmond.....	February 12, 11 A.M.....	Constructing bridges in seven townships.	Board of County Commissioners.
Illinois.....	Rock Island.....	February 12.....	Rebuild'g U. S. bridge and viaduct to arsenal inc. four new piers; cost, \$125,000.	Col. S. E. Blunt, U. S. A. Arsenal.
Indiana.....	Vincennes.....	February 12.....	Constructing nine bridges, Wayne Co.	C. E. Wiley, County Commissioner.
Alabama.....	Cullman.....	February 14, noon.....	Building steel bridge over Eight-Mile Creek.	Court of County Commissioners.
Ohio.....	Marion.....	February 14.....	Building 152 ft. bridge near Waldo.	County Commissioners.
Ohio.....	Cincinnati.....	February 15, noon.....	New wood work on iron bridge, Symmes twp.	Fred Dreihls, Clk. Co. Com'rs.
Texas.....	Houston.....	February 15.....	Constructing bridge over Clarke Creek.	John B. Ashe, County Auditor.
California.....	Porterville.....	February 18, 7:30 P.M.....	Constructing steel bridge.	Robert Horbach, City Engineer.
Pennsylvania.....	Washington.....	February 19, noon.....	Five spantruss span and two viaduct approaches, total length of steel work, 1,550 ft.	A. H. Nelson, Pittsburg, Engineer.
Ohio.....	Jefferson.....	February 25, 1 P.M.....	Reflowing bridge with "treated" lumber and wood block pavement; 3,000 sq. yds. blk.	P. C. Remick, County Auditor.
California.....	San Bernardino.....	February 25.....	Constructing bridge 253 ft. long; two 126-ft. spans.	L. A. Pfeiffer, County Clerk.
West Virginia.....	Williamson.....	March 15.....	Building steel bridge 580 ft. long, 90 ft. high	H. M. Payne, Ch. Engr. Mingo Coal Co.
Mississippi.....	Greenwood.....	April 1.....	Building bridge 300 ft. long.	C. W. Crockett, Chauncery Clerk.

Miscellaneous

Ohio.....	East Liverpool.....	February 8.....	Furnishing electricity for lighting city for five and ten years.	W. V. Blake, Mayor.
New York.....	Buffalo.....	February 8.....	Lighting streets and public buildings with gas, and furnishing private consumers, 5 years from March 1.	F. G. Ward, Com'r Pub. Works.
Wyoming.....	Fort Mackenzie.....	February 9, 10 A.M.....	Installing electric-light system at post.	Lt. R. H. Kelley, Q. M.
Pennsylvania.....	Philadelphia.....	February 9, 11 A.M.....	Furnishing motor generator set for navy yard.	Bureau Yards and Docks, Navy Dept., Washington, D. C.
Michigan.....	Northport.....	February 9.....	Constructing \$10,000 waterworks and light plant.	Chris. B. Kehl, Pres. Com.
Pennsylvania.....	Philadelphia.....	February 9.....	Generator set for navy-yard; estimate, \$3,750.	Mordecai T. Endicott, Navy Dept. Washington D. C.
Pennsylvania.....	Williamsport.....	February 11, noon.....	Construct'g under-grade crossing: 435,000 lbs. steel; 1,070 cu. yds. concrete; 220 ft. 4-ft. and 100 ft. 15-in. sewer; 14,000 sq. ft. cement sidewalk; 400 ft. drain tile; 400 sq. yds. brick pavement; 500 cu. yds. excavation, etc.	Jas. F. Fisher, City Engineer.
Ohio.....	Addyston.....	February 12, noon.....	Street lighting, 60 lights, more or less.	W. T. Coleman, Village Clerk.
Ohio.....	Cleveland.....	February 13, 11 A.M.....	Building steel file cases, Co. Recorder's office.	Julius C. Dorn, Clk. Co. Com'rs.
Massachusetts.....	Revere.....	February 15, 2 P.M.....	Building breakwater 1,000 ft., with shore arm 400 ft. long, of granite quarry grout, large blocks, 50,000 tons.	F. W. Hodgdon, Boston, Ch. Engr.
Arkansas.....	Fort Smith.....	February 15.....	Constructing 4 1/2 miles electric r.r., electric-light and power plant; cost, \$100,000.	Ira L. Reeves, Pres., Muskogee, I. T.
Arkansas.....	Fort Smith.....	February 15.....	Constructing electric railway 4 1/2 miles long; also electric-light and power plant, cost, \$100,000.	Ira L. Reeves, Muskogee, I. T.
South Carolina.....	Rock Hill.....	February 15.....	Lighting city for ten yrs.; contract carries franchise to use streets for incandescent lighting and power service.	John Boddey, Mayor.
Ontario.....	Toronto.....	February 19, noon.....	Constructing hydraulic dredge, complete.	Emerson Coatsworth, Mayor.
Connecticut.....	Waterbury.....	February 19, 8 P.M.....	Masonry channel for Little Brook.	R. A. Cairns, City Engineer.
California.....	Compton.....	February 19.....	Franchise for electric plant for lighting, etc.	Walter C. Burmahlin, City C.

Miscellaneous, Continued

Illinois.....	Chicago.....	February 20.....	Transmission lines, sanitary dist., cost \$15,000.	Edward B. Ellicott, Electrical Eng.
New York.....	New York.....	February 25, noon.....	Building monument to prison ship martyrs.....	Col. W. L. Marshall, Armory Bldg.
New York.....	Brooklyn.....	February 25, noon.....	Final disposition of garbage and kindred refuse for 5 yrs. from September 1.....	M. Craven, Com'r St. Cleaning.
Manitoba.....	Winnipeg.....	February 25, noon.....	Constructing single-track electric tramway 24 miles long; estimate, \$250,000.....	Magnus Peterson, Sec'y Bd. Control.
District of Columbia.....	Washington.....	February 25, 2 P.M.....	Renewing portions heating, lighting and power plant, State, War and Navy Building.....	Lt. J. H. Poole, Superintendent.
Michigan.....	Adrian.....	March 1.....	Removing garbage, 1 year from April 1.....	John Mawdsley, City Clerk.
Colorado.....	Aspen.....	March 1.....	Erecting power plant, inc. three 450-kw., 11,000 volt, 3-phase, 60-cycle generators, dir. con. to waterwheels under 500-ft. head.....	C. E. Doolittle, Manager.
Mississippi.....	Natchez.....	March 7, 4 P.M.....	Lighting for 10 years, from March 7, 1908.....	S. B. Stewart, Chm. Light Com.

STREET IMPROVEMENTS

Brewton, Ala.—At the spring election the question of issuing \$50,000 Escanaba County road bonds will be submitted to a vote.

Hollywood, Cal.—The citizens have petitioned Council for an appropriation to macadamize Sunset boulevard; estimated cost, \$100,000.

Atlanta, Ga.—Resolution calling for bids for street work during the year has been passed by Council.—Alderman Hirsch, Chairman, Street Committee; W. R. Joyner, Mayor.

Glencoe, Ill.—The Chicago-Milwaukee Electric Railway Company will improve certain streets in the village by asphalt pavement.

Ottawa, Ill.—The Board of Local Improvements has authorized the paving of East Ottawa throughout, with asphalt; it will cost about \$109,000, or about \$325 per lot.

Franklin, Ind.—The City Engineer is preparing estimates for paving certain portions of West Jefferson street.

Ft. Wayne, Ind.—The residents of Columbia avenue have petitioned for the improvement of the streets by paving with brick.

Ft. Wayne, Ind.—City Engineer Randall is preparing plans for paving East Washington, Harmer, Superior and Grayton avenues; bids for all of these improvements will be advertised early in the spring; new pavements were also ordered for Gay, Union and Dock streets, the latter to be paved with brick.

Mishawaka, Ind.—The paving question is now being agitated by Council; the material to be used has not been decided upon.

Richmond, Ind.—Street Commissioner Edward Dye has recommended the paving of half a dozen important streets.

Louisville, Ky.—Preliminary steps will be immediately taken for the paving of Market street from Vincennes to W. Ninth streets in New Albany, a distance of two miles, with vitrified brick. Attorney John H. Weathers, City Solicitor, has been directed to prepare the preliminary legislation; plans and specifications are being prepared.—Samuel T. Mann, City Engineer.

Saginaw, Mich.—The City Engineer estimates that \$350,000 is required for improving streets.

Hattiesburg, Miss.—The citizens have voted in favor of issuing bonds for street paving.

Carthage, Mo.—The property owners have petitioned for paving Court House Square and the city streets a block in each direction.

St. Louis, Mo.—The Board of Public Works has under consideration the paving of many streets.—W. M. Bryden, Secretary.

Millville, N. J.—Council has directed plans to be prepared for paving certain streets.

Albany, N. Y.—Bids will be received for improving Elk street, from Quail to North Lake avenue, and Ontario street, from Central to Livingston avenue.—Address Clerk Wachsmann, Board of Contract and Supply; an ordinance has been passed authorizing issue of \$45,000 bonds for improving North Allen street.

Troy, N. Y.—Council has adopted resolutions for paving Third street with asphalt.

Durham, N. C.—Council has petitioned Legislature for authority to issue \$275,000 bonds for improving streets and sidewalks.

Grand Forks, N. D.—Council has instructed the City Engineer to prepare plans, specifications and estimates for paving and repairing a number of streets and avenues; with brick, asphalt, and other material, and to submit same at the February meeting; Council is also considering petition for constructing streets and sewers.—Geo. E. Duis, Mayor.

Barberton, O.—The Engineer submitted estimates for the paving of High street, at \$19,000; he proposes to use a brick pavement and natural or artificial stone curbing, with a 6-inch concrete base; the construction of a storm sewer in District No. 2 has also been authorized.

Carrollton, O.—Council will pave the Square and North Lisbon street and South Lisbon street; probable cost, \$10,000.

Chardon Falls, O.—Bids will be received February 18 for curbing and paving certain streets, and certain portions of Franklin avenue, according to plans and specifications.—H. P. Bishop, City Clerk.

Columbus, O.—Ordinances have passed Council calling for the improvement of about seventeen sidewalks.

Columbus, O.—State Highway Commissioner Huston will receive bids shortly for constructing a number of State roads.—D. W. Seitz, Assistant Commissioner.

Dayton, O.—Improvement resolutions calling for the paving of Wyoming, Notre Dame avenue, and half a dozen alleys have passed Council.

Findlay, O.—An ordinance has been passed authorizing an issue of \$35,000 bonds for street improvements.

Fostoria, O.—The petition calling for the paving of Canter street has been received, and the improvement will doubtless be authorized.

Greenville, O.—A number of city officials have visited Indiana cities to inspect the paving, with a view of constructing a large amount of macadam.

Greenwich, O.—This town is about to take up a very extensive campaign for street improvements, including pavements.

Hamilton, O.—The Commissioners of the County, Trustees of Fairfield township and Engineer Dillon have decided to improve Grand boulevard, the expense to be jointly borne by the city and the county.

Lima, O.—Plans have been issued for the proposed paving of North Main and South Pine streets; contracts will be let within thirty days; the paving of Elizabeth street will be awarded by the property owners themselves.

Lorain, O.—The paving of Penfield avenue has been definitely determined on; it will be preceded, however, by the construction of a storm water sewer, which will be undertaken early in the spring; Council will doubtless take favorable action on a petition to pave Reid street.

Marion, O.—The resolution providing for the paving of South Prospect street has passed Council; J. V. Wilson was the original petitioner for the extensive improvement.

Massillon, O.—Plans for the paving and curbing of Bank and Summit streets have been referred to the committee of the whole; of seven miles of sidewalk ordered last year, two remain to be laid, and the Board of Public Service has decided to advertise very shortly for the completion of this work; the Board has also decided to pave a number of alleys; plans will also be made for a considerable amount of paving, curbing, and guttering, and are shortly to be prepared by City Engineer Howald.

New Lexington, O.—Council has been asked to pave Mill street, one of the leading thoroughfares of the town, shortly, and this will be followed by the paving of a number of other streets.

Portsmouth, O.—The Board of Public Service has been directed to bring in plans and estimates for a new sidewalk of cement on Second, Chillicothe and Gallia streets, and on Eighth, Fifth and Gallia streets from John to Bond street; this covers the entire business section of the city; paving was also authorized on a number of the streets, including Sixth, Union, Eighth, Grant, Young and Gage.

Struthers, O.—Council will let contracts for a large number of sidewalks as soon as bids can be advertised.

Troy, O.—The paving of several of the leading streets has been decided on, and the question of the use of creosote block, asphalt and brick is now under consideration.

Carbondale, Pa.—The city has awarded \$20,000 4 per cent, semi-annual 10 5-6-year average paving bonds to Otis and Hough for a premium of \$153.75; the other bidders were: W. J. Haynes and Sons, a premium of \$17; Denison and Farnsworth, a premium of \$1.46; the First National Bank of Carbondale, par.—H. T. Williams, City Clerk.

Chattanooga, Tenn.—An ordinance is before Council authorizing issue of \$150,000 bonds for defraying cost of extending Commercial street.

Pottstown, Pa.—Several Councilmen are opposed to any more street paving until sewers are laid; Council is undecided as to the disposition to be made of \$16,000 soon to be paid for a trolley privilege.

Dyersburg, Tenn.—The citizens have petitioned Legislature for authority to issue \$150,000 county road improvement bonds.

Newport News, Va.—An election will be held, February 28, to decide the question of issuing \$100,000 street improvement bonds.

Suffolk, Va.—Council is preparing to pave several streets.

Seattle, Wash.—Bids will be received, February 9 or 16, for the improvement of Jackson street, et al., by regrading the same; the maximum cut involved is about 90 feet; in addition to the regrading of the streets and avenues in this district, the contract will provide that the owners of property within this district may have their lots excavated to the street grade by the contractor for the public portion and at the same price; the amount of earth to be removed from the private property is about 1,400,000 cubic yards, and the estimated cost of the public portion is \$450,000. Following is a list of quantities to be bid upon: Fixed estimate, \$10,000; clearing and grubbing, lump sum; earthwork, excavation, 1,770,000 cubic yards; earthwork, embankment, 1,363,000 cubic yards; retaining walls, concrete, 600 cubic yards; iron railing, 500 lineal feet; bulkheads, piling, 50,000 lineal feet; bulkheads, lumber, 500 M. feet, B. M.; bulkheads, iron 200,000 pounds; bulkheads, oak blocks, 1,500; lumber, new, 100 M. feet, B. M.; relaying old lumber, 100 M. feet, B. M.; sewer box, 10,000 lineal feet.—C. B. Bagley, Secretary, Board of Public Works.

Walla Walla, Wash.—An ordinance has been passed authorizing issue of \$160,000 street improvement bonds.

SEWERAGE

Augusta, Ga.—The Public Works Department will resurface the lower part of Broad street from Center to East Boundary, and Greene street from Second to Fifteenth streets; also to pave Reynolds street with brick from Sixth to Ninth streets. Address Commissioner Wingfield.

Alton, Ill.—The residents in certain districts demand the construction of sewers in Pearl and a number of other streets.

Greentown, Ind.—The Town Board is asking for bids for the construction of a sanitary sewer system.

Davenport, Ia.—Council is considering laying of sewers in South avenue and Farnam, Lombard and Cherry streets.—Hugo Moeller, City Clerk.

Marshalltown, Ia.—The City Engineer is preparing plans for a pumping plant for the Third Ward sewer system; estimated cost, \$23,000.

Lake Charles, La.—The city is considering the establishment of sewer system.—Leon Locke, Secretary.

Rolla, Mo.—William E. R. Compton, bond and mortgage company, of Macomb, Mo., have purchased \$48,000 water and sewer bonds, at a premium of \$966.

Trenton, N. J.—Bonds, \$63,000, have been voted to extend sewer system.

Akron, O.—Hunt and Wigley have the contract for laying sewers in Hickory street, for both storm and sanitary purposes, at \$15,353.

Bellfontaine, O.—Preliminary estimates on a sewer system place the cost at about \$100,000; Council will take this question up at its forthcoming meeting.—Councilman Downs, Chairman, Sewer Committee.

Cleveland, O.—Ordinances are before Council for construction of sewers in Hyde and Denison avenues.—Peter Witt, City Clerk.

Follansbee, O.—Plans and profiles for a sewage system, which were presented to the Council by Engineer Miller, of Pittsburg, Pa., will probably be accepted; they provide for a very extensive system.

Lima, O.—Preliminary legislation has been enacted for the paving of Metcalf, Elizabeth, West and Richy avenues, also of the construction of a large number of sewers.

Miamisburg, O.—G. W. Riley, an engineer, announces that the authorities will build a five-foot storm water sewer which will empty into the Miami River.

Niles, O.—Mayor W. F. Thomas has presented the plans for the sewer system of the town to the State Board of Health.

Salem, O.—City Engineer D. M. French has recommended that additional rights of way be secured along the line of the pro-

posed trunk line sewer, to be used temporarily for storing materials, etc.

Springfield, O.—Ordinances have been passed providing for an issue of \$35,000 bonds for construction of sewers.

Struthers, O.—Engineer Montgomery will furnish Council with an estimate of the cost of constructing proposed sewer system shortly.

Urbana, O.—The town has decided to put in extensive new sewer system; it is desired to negotiate a bond sale for this improvement.—F. S. McCracken, Chairman, Street Committee.

Youngstown, O.—John Grady is low bidder for the Hazel and West Federal street sewers, and Gartland Brothers are low on Fulton and Foster street sewers.

Erie, Pa.—A sewage disposal plant has been ordered built at the State Insane Asylum at North Warren by the State Department of Health.

Jenkinson, Pa.—The question of issuing \$60,000 sewer bonds is under consideration.

Orangeburg, S. C.—Bids were received, January 23, for constructing approximately ten miles of 8 to 20-inch sanitary sewer, as follows: Ebaugh & Ebaugh, Greenville, \$59,050.28; Frederick Nunshall, Abbeville, \$53,676.35; B. F. Sweeten & Son, Camden, N. J., \$49,606.98; engineer's estimate, \$52,488.20; bids were rejected as too high, the Sewerage Commission being of the opinion that the work can be done for \$3,500 per mile; new bids will be received, February 28.—Edward Hawes, City Engineer.

WATER SUPPLY

Waterbury, Conn.—Bids will be received February 18, for the purchase of \$15,000 water bonds.

Pensacola, Fla.—Council is considering recommendation of School Trustees, that city submit proposition to purchase the plant of the Pensacola Water Company for \$180,000, including all pipes, mains, etc.; T. Chalkley Hatton, Consulting Engineer, has submitted report on the matter.

Atlanta, Ga.—Council has called an election, March 5, to vote on issue of \$500,000 water bonds; there is urgent need of new 36-inch main from the river to the reservoir, a new 20,000-gallon pump, coagulating basin, and new mains in the congested portions of the city. Frank P. Rice, President, Board of Water Commissioners.

Bloomington, Ill.—Bonds, \$14,000, have been voted for the construction of a water plant.

Winthrop Harbor, Ill.—The taxpayers have voted to purchase water system owned by a private company.

Indianola, Ia.—The Indianola Power Company has been granted a franchise for a water system.

Mineral, Kan.—A special election will be held to decide the question of issuing \$10,000 bonds for the construction of a water plant.

Flint, Mich.—The Board of Commissioners has decided to extend water mains.

Hilliards, Mich.—The city is preparing to expend \$30,000 for the purpose of improving and enlarging the city waterworks plant.

Gibbon, Minn.—The tax-payers have decided to issue \$15,000 in bonds for the waterworks system.

Virginia, Minn.—Council has decided to extend water mains on certain streets, and purchase additional fire hydrants.

Hoosick Falls, N. Y.—The citizens have voted \$75,000 bonds for the purchase of water plant.

Bloomington, Neb.—The citizens have voted \$14,000 bonds for the erection of a water plant.

Tekamah, Neb.—An election is to be held to decide the question of issuing \$10,000 bonds for remodeling water system.

Columbus, O.—Bonds, \$27,500, will be sold to purchase piping for the new water percolation plant; ordinances are before Council authorizing bonds for the construction of filter plant and extension of water mains.

Sandusky, O.—The City Engineer has been directed to secure estimates for the establishment of a filter plant.

Childress, Tex.—Council has been petitioned for franchise to establish a system of waterworks.

Temple, Tex.—Council has the matter under consideration of issuing bonds for establishing a water plant.

Follansbee, W. Va.—D. J. Sinclair of Steubenville, O., has petitioned for franchise to build water system.

Eau Claire, Wis.—An ordinance has been passed authorizing issue of \$100,000 bonds for the purchase of water plant for private company.

Sparta, Wis.—About \$8,000 will be expended to secure water for domestic use and fire protection at County Farm; there will be a 50,000-gallon tank, tower, pipe, etc. W. Leverton, Chairman of County Commissioners.

Waukesha, Wis.—Council has directed appraisal to be made of the water plant owned by a private company; the matter of purchasing the plant is under consideration.

LIGHTING AND ELECTRICITY

Huntsville, Ala.—W. J. Bennett & Co. have taken the contract to dig trenches for the New York-Alabama Oil Company, for the pipe to be used in conveying gas from its wells in West Huntsville to the city; work has already begun and pipe laying will begin soon; the main pipe, two miles long, and about ten miles of smaller piping have been received, and this is said to be only a fraction of the order that has been placed by the company.

Argenta, Ark.—Council has passed an ordinance authorizing the Argenta Light & Power Co. to issue \$65,000 in bonds for the purpose of meeting its indebtedness and completing the construction and equipment of the new light and power plant.

Ozark, Ark.—The Board of Aldermen has under advisement the proposition of the Altus Electric Light Company to extend line to Ozark.

Pasadena, Cal.—Council has authorized Superintendent Glass, of the lighting plant, to prepare plans for further additions to the lighting plant.

Roseville, Cal.—Franchise has been granted to Ed. Levi to furnish electric light.

Rio Vista, Cal.—The plant of the Rio Vista Electric Light Company has been destroyed by fire; the lighting plant was owned principally by the Bank of Rio Vista; it was equipped with the most modern machinery; it will be rebuilt at once.

Greely, Col.—The Central Power Company is considering establishing a water plant on the Poudre River in Zimmermann's valley, 75 miles above Fort Collins; the dam will be 200 feet high and will back the water up the valley for a distance of seven miles. Address C. H. Moffatt, Denver.

Longmont City, Col.—Council is entertaining a proposition for the construction of a city power and heating plant, a semi-municipal plan offered by J. P. Smith.

Demorest, Ga.—The matter of issuing bonds for the construction of a lighting plant is under consideration.

Marion, Ind.—The Marlon Lighting and Heating Company will extend its plant; William F. Thompson, Chief Engineer.

Council Bluffs, Ia.—The Omaha Light and Power Company will expend \$50,000 in improvements in Council Bluffs; the old gas mains will be repaired and larger ones constructed.

Tama, Ia.—An election will be held to decide the question of issuing \$10,000 bonds for equipping and maintaining a municipal lighting plant.

Belleville, Kan.—The Mayor has advertised for bids for the purchase of \$20,000 electric-light bonds.—J. E. Caswell, manager.

Bay City, Mich.—The Midland Electric Light & Power Company will petition for franchise to establish lighting plant.

Pontiac, Mich.—Kurt Kling is at the head of a company desiring to secure franchise for gas and electric-lighting plant.

Minneapolis, Minn.—Council will petition Legislature for authority to issue \$2,000,000 bonds for the purchase of gas plant.

St. Hilaire, Minn.—The Duluth Engineering Company is preparing plans for proposed electric-light plant.

Lynn, Mass.—On motion of Councilman Boland the Council voted in favor of the appointment of a joint committee of the Aldermen and Council to consider the advisability of establishing a municipal lighting plant; the order calls for a report within three months.

Schenectady, N. Y.—The Schenectady Illuminating Company will expend \$700,000 in improving plant.—Hinsdill Parsons, President.

Blue Hill, Neb.—The citizens will vote bonds in the near future for a lighting plant.

Omaha, Neb.—The Omaha and Council Bluffs Street Railway has petitioned Legislature to give interurban lines power to sell current for light, power and heating purposes along its lines.

Tekamah, Neb.—An election will be held to decide the question of issuing \$10,000 bonds for the construction of lighting plant.

Princeville, Ore.—Bids will be received in the near future for the construction of a plant, estimated to cost about \$200,000, for the Pringle Falls Electric Power and Construction Company.—W. H. Houston, Engineer.

Aberdeen, S. D.—Bids will be received, February 11, for the purchase of \$35,000 20-year 4½ per cent. electric-light bonds.—F. M. Raymond, City Auditor.

Bluff City, Tenn.—The Bluff City Electric Light Company has sold to a Bristol, Tenn., syndicate, which will at once rebuild the dam in the Holston river at this place; it is proposed to furnish lights for Bristol, Tenn., also to install a rock crusher and wood working plant.

Denison, Tex.—The directors of the Denison Light and Power Company have decided to make improvements for the plant at a cost of about \$50,000.—W. B. Munson, President.

Lacrosse, Wis.—The Lacrosse Gas and Electric Company will soon have plans prepared for doubling the capacity of their plant; an addition 70x100 feet will be built.

FIRE EQUIPMENT AND SUPPLIES

Hot Springs, Ark.—Bids will be asked for the erection of a fire house in the South Side.

Pasadena, Cal.—Commissioners will ask for bids for the purchase of \$4,500 bonds for the construction of a fire house.

Sacramento, Cal.—The Fire Committee recommends the purchase of a second runabout; bids will be asked.

Morris, Ill.—Council has been petitioned to build a fire house and purchase an engine for the Fire Department.

Burlington, Ia.—Council is in favor of building three additional fire houses.

Louisville, Ky.—The Police and Fire Committee of the General Council recommend an appropriation of \$63,000 for the Fire Department; it is proposed to purchase a steam fire engine, two combination chemical hose wagons and three thousand feet of hose.

Fergus Falls, Minn.—Council will soon advertise for the purchase of 1,000 feet of hose.

Willmar, Minn.—The Fire Department has petitioned Council for the purchase of additional fire apparatus.

Columbus, O.—The Fire Department Committee ask for an appropriation of \$75,000 for the erection of a fire house in the wholesale district.

Elm Grove, W. Va.—The insurance men recommend that Council purchase fire apparatus.

Milwaukee, Wis.—The Fire Department has asked for an appropriation for the erection of an engine house in the Fourteenth Ward.

PUBLIC BUILDINGS

Andalusia, Ala.—The citizens have voted in favor of issuing \$15,000 school bonds.

San Jose, Cal.—Plans for the new \$175,000 high school provide for a group of five buildings, the five largest grouped about a central executive building, in which will be located the Assembly Hall, and there will be two entirely enclosed courts, and one open court; plans have also been prepared for a \$50,000 grammar school, and for remodeling of two old grammar schools.—F. S. Allen, Pasadena, Architect.

Watertown, Conn.—The Center School District has voted to build a twelve-room school for \$40,000, to replace one destroyed by fire.

Chicago, Ill.—The matter of issuing \$10,000 bonds for the erection of a school building will be submitted to a vote of the people in April.

Princeville, Ill.—Bids will be received, February 7th, for the purchase of \$7,000 school bonds.—E. B. Minkler, Clerk.

South Bend, Ind.—N. W. Harris & Co. has purchased \$210,000 bridge bonds and \$60,000 asylum bonds; the company's bid was \$273,162.

Tuttle, I. T.—An ordinance has been passed authorizing issue of \$10,000 school bonds.

Cedar Rapids, Ia.—An election will be called, February 18, to decide question of issuing \$125,000 bonds for building City Hall.

Lafayette, La.—Bids will be received, February 18, for the purchase of \$18,000 5 per cent. school bonds.—L. J. Alemann, Secretary.

Newton, La.—The citizens have voted \$40,000 bonds for the erection of a school house.

West Monroe, La.—The town has voted to issue bonds for the construction of Town Hall and municipal lighting plant.

Negaunee, Mich.—Bonds, \$85,000, will be sold for a new high school building.

Saginaw, Mich.—Plans are being prepared for the County Court House; cost, \$20,000.

Norway, Mich.—Plans have been prepared for a City Hall, 60x92 feet; cost, \$20,000.—J. D. Chubb, Marquette, Architect.

Midland, Mich.—Bonds, \$60,000, will be issued for a new Court House.

Livingston, Mont.—The County Commissioners will readvertise and receive bids, March 1, for the purchase of \$25,000 4 per cent. jail bonds.

Albany, N. Y.—Bids will be received for placing the Fifth Precinct Police Station in condition; also for remodeling the West End library.—Address Clerk Wachsmann, Board of Contract and Supply.

Greenboro, N. C.—A special election will be held, March 12, to vote on issue of \$30,000 school bonds.—John S. Michau, City Clerk.

Cortland, Neb.—The issuing of \$60,000 Court House bonds will be submitted to a vote of the people.

Neligh, Neb.—Bonds, \$25,000, have been voted for the erection of a school house.

Beaver Dam, O.—Bonds, \$20,000, will be issued for building a new school house.

Bessemer, O.—Bonds, \$45,000, will be sold for constructing a new high school.

Dayton, O.—Bids will be received, March 7, for \$250,000 bonds for the erection of a County Memorial Building.

Martin's Ferry, O.—Bonds, \$50,000, will be

sold for constructing a new city building.

Dayton, Tenn.—Bonds, \$12,500, for school have been authorized by vote.

Gallatin, Tenn.—A committee has been appointed to arrange for the erection of a \$12,500 jail building for Sumner county.—William Hall, Chairman.

Jackson, Tenn.—The Council has authorized an issue of \$80,000 school bonds and \$15,000 for better fire protection.

Jellico, Tenn.—The Mayor and Council have purchased site at Main and Beaver streets for a Town Hall, and it will be erected at once; the building will contain the offices of the municipal government, city court room, assembly hall, etc.

St. Catharines, Ont.—The city will issue \$3,000 debentures for school site.

STREET RAILWAYS

Pine Bluff, Ark.—The Citizens' Light and Transit Company is preparing to build an extension from Main street to Sixth avenue and Ohio street.

Freeport, Ill.—The stockholders of the Freeport Railway, Light & Power Company have decided to expend \$35,000 in putting in a new plant at Brown's Mill to be used in creating a lighting service and power service; additional equipment will be purchased.—A. J. Goddard, General Manager.

Hoopeston, Ill.—The directors of the Interstate Traction Company may increase the capital stock of the company; and will also take up the matter of building an electric road from Hoopeston to Danville.—J. A. Cunningham, Secretary.

Joliet, Ill.—The Joliet & Southern Traction Company is preparing to issue \$1,500,000 in bonds for improvements; \$50,000 will be issued at once.—H. A. Fisher, President.

Jacksonville, Ind.—H. L. Hyatt, General Manager of the Jacksonville Electric Company, has secured a 20-year franchise for building electric lines in the town of Hymara.

Glenwood, Ia.—The owner of the Glenwood Electric Light Plant is arranging to run a line from Plattsmouth City and furnish the town with lights.

Ann Arbor, Mich.—The stockholders of the Detroit, Ypsilanti, Ann Arbor and Jackson Ry. Company have decided to issue \$4,000,000 bonds for betterments.

Mt. Clemens, Mich.—There is a movement under way to induce the Rapid Railway to extend its city line on Case avenue from the Grand Trunk depot to the Clinton Grove cemetery.

Jefferson City, Mo.—The Central Interurban Traction Company, of St. Louis, has been incorporated with a capital stock of \$50,000 to construct and operate a street railroad in St. Louis, no description being given.—Charles A. Gutke, Lee A. Hall and others, Incorporators.

St. Louis, Mo.—The Central Interurban Traction Company has been chartered to build and operate street railways.—Address Lee A. Hall.

Geneva, N. Y.—The State Board of Railroad Commissioners has consented to the issuance by the Geneva, Phelps & Newark Railroad Company of a first mortgage for \$700,000; road 15 miles in length will be constructed.

Ithaca, N. Y.—The Ithaca-Seneca Falls Electric Interurban Railway has been incorporated with a capital stock of \$1,000,000. Jacob Rothchild, president, Ithaca.—J. N. Hammond, Seneca Falls, Secretary.

Akron, O.—Work on the Massillon & Akron Electric Street Railway will be started in the early spring.—W. S. Mitchell, Barberton, General Manager.

Lima, O.—Right of way has been taken up and franchises secured through the village of Lafayette and town of Ada for an electric trolley road extension of the city lines under lease to the Schoepf-Morgan system.

Houston, Tex.—The Houston Electric Company proposes to spend \$500,000 for improvements, betterments and extensions.—David Daley, Manager.

BRIDGES

Marysville, Cal.—The Board of Supervisors has granted the Northern Electric right to construct and maintain a bridge across the Sacramento about one-half mile northwest and above Chico Landing and about 240 feet below the site of the former toll bridge. One hundred feet is designated as the width of the draw, and two hundred and twenty-five feet as the length of the draw span, thereby permitting an opening of 100 feet in width and 120 feet in length on each side of the three other spans required in the construction of the bridge.

Winters, Cal.—A street bridge is to be constructed over the Putah Creek by the Southern Pacific; the supervisors of Yolo County have the plans.

Bridgeport, Conn.—Council has under consideration an issue of bonds for the construction of bridge, over the Pequonock river; estimated cost, \$150,000.

Jacksonville, Fla.—Council has adopted a resolution declaring the construction of a

viaduct across the tracks of the Southern Railway and the St. Johns River Terminal Company, a necessity.

Atlanta, Ga.—A Committee of Council has been appointed to confer with the Board of County Commissioners in regard to building a viaduct over the Western and Atlantic and Southern railroads in Bellwood avenue.—Mayor Pro-Tem Sullivan, Chairman.

Terre Haute, Ind.—Bids will be received March 5 for the purchase of \$34,178 Wabash River bridge bonds.—Jerome W. Denehie, County Auditor.

Wabash, Ind.—The flood has injured over fifty bridges in Wabash county; improvements will be made.

Centralla, Ia.—Council proposes to build a steel bridge at South Hickory street.

Des Moines, Ia.—Council has decided to locate new viaduct at Seventh street; the railroads have agreed to build a viaduct on Seventh street provided the street car company pays its share of the expense; railroad engineers, the street car engineers and City Engineer Dobson will draw plans.

Sebewaing, Mich.—The bridge in the business center of the town is in dangerous condition, and will be given prompt attention.

Fergus Falls, Minn.—The Ottertail County Commission has petitioned Legislature to secure appropriation from the State for building iron bridges at various points in Ottertail County.

Rice, Minn.—A new bridge will be erected to replace the one recently destroyed by floods; cost, \$17,000.

Buffalo, N. Y.—The Delaware, Lackawanna and Western Railway has decided to replace the swing bridge over the Ohio Basin Slip between Elk and Miami streets with a new structure.

Lorain, O.—The North street bridge has been destroyed by flood; a new bridge will be built.

Norwood, O.—A special election will be held March 18 as the date for vote on issue of bonds for the building of the Section and Marion avenue viaducts.

Niles, O.—Council has appropriated \$2,500 bonds for bridge over Mosquito creek.

St. Marys, O.—Several bridges have been washed out in the city; plans are under way for the construction of new ones.

Toledo, O.—The application of the L. S. & M. S. railroad for permission to build a bridge across Swan creek, from the foot of Monroe street to Goose Point, was approved by the Council Committee on Public Improvements.

Wapakoneta, O.—Bids will be received February 12 for the purchase of \$30,000 Auglaize county bridge bonds.—W. H. Meyer, County Auditor.

Knoxville, Tenn.—The City Engineer has been directed to examine the condition of the city bridges and report same to Council; an ordinance is before Council for the issuance of \$12,500 bridge improvement bonds.

Temple, Tex.—The Commissioners' Court of Bell county has authorized the issuance of \$20,000 in 3½ per cent. forty-year bridge improvement bonds.

Watertown, Wis.—Darnfield & Kunert are preparing plans for a new bridge to be built by the city; estimated cost, \$30,000.

MISCELLANEOUS

Live Oak, Fla.—Bids will be received, March 30, for the purchase of \$200,000 5 per cent. 30-year public improvement bonds.—F. A. Miller, Secretary.

Mangum, I. T.—The matter of issuing \$45,000 bonds for the erection of sewers and electric-light plant will be submitted to a vote of the people.

Waterloo, Ia.—Council has decided to issue \$12,500 improvement bonds.

Alexandria, La.—February 12, an election will be held to decide the question of issuing \$46,000 bonds for the erection of City Hall and sewer system.

Haverhill, Mass.—The City Treasurer has secured a temporary loan of \$100,000 from Blake Bros. & Co. for 4.95 per cent. plus \$1 premium; Loring, Tolman & Tupper bid 4.95; Edgerly & Crocker, 5.12½; Estabrook & Co., 5.15; Jose, Parker & Co., 5.05 for \$50,000, and 5.19 plus \$1.25 for \$50,000; making an average for the bid of 5.12 plus \$1.25.—Roswell L. Wood, Mayor; Frank E. Holland, City Clerk.

St. Paul, Minn.—\$25,000 4 per cent. 30-year Park bonds have been awarded to E. H. Robbins and Son at \$453.75 premium.

Kansas City, Mo.—The city administrators have revived the plan to issue \$625,000 improvement bonds.

Albany, N. Y.—Bids will be received for the removal of dead animals.—Address Clerk Wachman, Board of Contract and Supply.

Troy, N. Y.—The Commissioners of Public Works recommend the purchase of garbage wagons, street sprinklers and street sweeping machines.

Atlantic City, N. J.—Bids will be received, February 9, for the purchase of \$50,000 water, paving and hospital bonds; interest 4½ per cent.

Grand Forks, N. D.—Council has passed an ordinance providing for the removal and dis-

posal of garbage.—Geo. E. Duis, Mayor.

Mangum, O.—An election will be held to decide the question of issuing \$45,000 sewer and lighting bonds.

New London, O.—An entire new sewer system, waterworks plant, and macadam streets are deemed necessary by citizens who are taking steps to make these improvements.

Norwood, O.—An election will be held, March 18, to decide on issue of \$105,000 bonds for building viaduct and market house.

Springfield, O.—The 11 sewer assessment ordinances have passed Council and the \$35,000 bond issue for connecting up the dead ends and laying new waterworks extensions have passed Council; the latter improvement will require 26,000 feet of pipe.

Springfield, O.—The city has purchased a street flushing machine from the Sanitary Street Flushing Machine Co., of St. Louis.—W. H. Sieverling, City Engineer.

Harrisburg, Pa.—A garbage disposal plant will be constructed.—J. J. Sheeskey, Chairman, Special Committee; M. B. Cowden, City Engineer.

Hollidaysburg, Pa.—Bids will be received, February 11, for the purchase of \$200,000 30-year 4 per cent. Blair county bonds.—W. S. Hotner, County Clerk.

Reading, Pa.—The Board of Water Commissioners will expend \$1,700 for floral decoration at the various reservoir grounds in the city during 1907.

Knoxville, Tenn.—The Sanitary Department has asked for an appropriation of \$20,000 for 1907, an increase of \$5,000 over last year; an automatic street washer is needed for use on streets in the paved district.

Milwaukee, Wis.—Bids will be received for the purchase of \$20,000 park bonds, recently authorized by voters.

Beaumont, Tex.—The proposed issue of \$130,000 5 per cent. bonds for paving, sewers and school house improvements has been submitted to the Attorney General for approval.

Dallas, Tex.—Council has decided to purchase two street flushing machines.

Houston, Tex.—The City Commission has purchased 36 acres of land, adjoining the city, for \$45,000, to be used for park purposes, and will utilize a part of the land as a reservoir for the storage of artesian water.

Gassaway, W. Va.—An issue of \$20,000 improvement bonds has been voted.

Chattanooga, Tenn.—Council will submit to vote of the people ordinance for issue of \$50,000 bonds for parks.—Alex. W. Chambliss, Mayor; J. C. Mansfield, Superintendent of Parks.

Madison, Wis.—The City Capital Commission proposes to build complete heating plant to furnish city buildings in rear of the Capitol.

Marinette, Wis.—The New York-Wisconsin Company has been organized to erect a cement works at Rush Lake; an electric road is to be built from Rush Lake to this city.

Racine, Wis.—An issue of \$30,000 bonds is being considered for river and harbor improvements.

BIDS RECEIVED

PAVING AT AUBURN, N. Y.

Bids were received January 15th for paving Genesee street, Auburn, N. Y., the items being 18,800 square yards of asphalt paving (3 inches of asphalt on 6 inches of 1:3:6 concrete, excavation included); 10,500 square yards of brick paving (on 8 inches of 1:3:6 concrete); 1,260 square yards of Medina sandstone pavement; 12,000 lineal feet of curbing (5x16 inches, set in concrete and underdrained with tile); 550 lineal feet of protection curbing; 20 catch basins, and 100,000 square feet of sidewalks to be relaid. The bids were as follows:

Paving:	Barber Asphalt Paving Co.	Brayer Bros. Co.	Warner Bros. Quinlan Co.
Asphalt	\$2 24	\$1 75	\$1 87
Mack block	2 65	2 40	2 20
Metropolitan block ..	2 65	2 35	2 20
Pittsburg-Buffalo	2 51	2 40	2 18
Corning block .....	...	2 32	...
Medina sandstone	3 60	3 00	3 00
Curbing:			
Auburn gray limest'e ..	.98	.90	.75
Medina sandstone ....	.95	.82	.67
Berea sandstone .....	.85	.80	.70
Protection curbing ...	.40	.50	.40
Catch basins	52.00	50.00	40.00
Relaying sidewalks ...	.05	.03	.03

The Warner-Quinlan Co. was low bidder on the total paving, whichever kind of brick and curbing be used; Brayer Bros. were low if the brick paving be not included.

Argenta, Ark.—A contract for installing sewer system has been let to Peay Construction Company, Little Rock, Ark., at \$64,400; other bids received were: O'Neil Engineering Co., Dallas, Tex., \$65,000; Edward Wiegal, Little Rock, Ark., \$68,500.

Van Buren, Ark.—The Prather Construction Company was awarded contract for con-

structing vitrified clay circular sewer, at \$10.-290, as follows: 2,660 feet, 6-inch, 34 cents per lineal foot; 12,150 feet, 8-inch, 49 cents; 1,100 feet, 10-inch, 40 cents, and 1,775 feet, 12-inch, 56 cents, pipe to be laid in 6.6 to 8.14 foot trench, sand and clay excavation, no ground water to be handled and no paving to be excavated and relaid; manholes, \$3; flush tanks, including flushing appliance, \$45; wages of common labor, \$1.50 per day; other bidders were So. Eng. and Con. Co., \$10,442; Municipal Con. Co., Kansas City, Mo., \$11,995; Pomeroy Paving & Con. Co., \$10,967.60; Bruce Bros., Fort Smith, \$17,104; J. B. Knowles, Kansas City, \$11,750; Estimate, \$10,967; mean of all bids, 6-inch pipe, 34 cents; 8-inch pipe, 4½ cents to 73 cents; 18-inch pipe, 55½ cents; 12-inch pipe, 60 cents per foot.—Theo. Hartman, Little Rock, Consulting Engineer.

Fresno, Cal.—A Michaels has been awarded contract to construct Fresno County Almshouse, to be complete in four months, for \$27,162; other bidders were: D. A. Cowan, \$28,880; J. P. Olsen & Co., \$30,945; Z. T. Maxwell, \$28,777, and G. H. Walley, \$29,550.—A. D. Ewing, Clerk Board of Supervisors.

Pasadena, Cal.—The Hillside Construction Co. was awarded the contract for the grading, curbing, guttering and oiling of Los Robles avenue from Washington street to Woodbury Road, at \$12,729.78; other bids were Chris Larsen, \$13,457.95 and the McD.-Lee Construction Company, \$13,375.30.

East St. Louis, Ill.—M. J. Keeley was awarded contract for grading, paving, sewers, etc., in Thirteenth street, at \$43,176.40, bids being opened, January 28, the bid being as follows: Laying 6-inch pipe, laid, 23 cents per foot; 10-inch pipe, 40 cents; 12-inch, 60 cents; 15-inch, 70 cents; 18-inch, 80 cents; 20-inch, \$1.10; cast-iron manhole covers and stone inlets, \$12 each; brick masonry, \$9 cubic yard; limestone curb, set, 60 cents per foot; excavation placed in fill, 25 cents per cubic yard; filling in excess of excavation, 20 cents per cubic yard; total, except paving, \$15,771.40; laying Albion brick on 6-inch concrete, 18,270 square yards, at \$1.50; total, \$27,405; Mr. Keeley offered Wabash or Purinton brick at \$1.56 and Banner brick at \$1.51; Walter Coonan, B. M. Sweeney and W. H. Hill also submitted proposals.—W. J. Crocken, City Engineer.

Jacksonville, Ill.—Contract for constructing sewer in West Edgmon street has been let to Joaquin Vasconcellos.

Vincennes, Ind.—Contract for constructing bridge on Klein Road over Plass Ditch has been let to Vincennes Bridge Company, at \$2,100.

Des Moines, Ia.—J. C. Likes was low bidder for constructing 1,364 feet, 30-inch vitrified pipe sewer in 7½-foot trench, clay excavation and handling ground water, at \$3.07 per lineal foot; \$4, manholes included in price; total, \$4,187.48; wages of common labor, \$1.75 per day of nine hours; other bidders were: Christie Construction Company, \$5,592.40; Day & Smith, \$4,296.60; P. J. Griffin & Co., \$4,814.92; Shepard & Hanrahan, \$4,228.40; King Lambert Construction Company, \$4,528.48; Jas. Horrabin & Co., \$4,692.16; Cook Construction Company, \$4,637.60; O. P. Herrick, \$4,623.96.—George D. Dobson, City Engineer.

Indianapolis, Ind.—Bids have been received by the Board of Works, as follows: For brick roadway in first alley west of Capitol avenue, from Eleventh to Twelfth street: American Construction Company, \$1.57; George W. McCray, \$1.56; Marion Caldwell, \$1.65; City Construction Company, \$1.64; unsigned bid, \$1.50; for brick roadway in Sixteenth street, from Columbia avenue to L. E. & W. railway: Marion Caldwell, \$4.94; City Construction Company, \$4.89; L. J. Cooper, \$4.65; Indiana Paving Brick and Block Company, \$4.49. For brick roadway in Sixteenth street, from Martindale avenue to Columbia avenue: Marion Caldwell, \$3.91; L. J. Cooper, \$3.84; City Construction Company, \$3.91; Capital Paving and Construction Company, \$3.49; for brick roadway in first alley east of Illinois street, from first alley south of Pratt street: George W. McCray, \$1.65; American Construction Company, \$1.70; Marion Caldwell, \$1.76; for brick roadway in first alley east of Illinois street, from first alley south of Pratt street to Pratt street: George W. McCray, \$1.15; Marion Caldwell, \$1.21; American Construction Company, \$1.14; for brick roadway in first alley east of Illinois street, from Pratt street to first alley north: American Construction Company, \$1.02; George W. McCray, \$1; Marion Caldwell, \$1.16; for brick roadway in first alley north of Pratt street, from Superior street to first alley west: Marion Caldwell, \$1.18; American Construction Company, \$1.16; George W. McCray, \$1.15; for gravel roadway, curb and cement walks in Market street, from Greeley to Bloomington street: J. V. Baxter, \$3.11; Marion Caldwell, \$3.45; William H. Hall, \$2.90.

Melrose, Mass.—F. A. Houdlette & Son, of Boston, were, January 14, awarded contract to furnish Public Works Department with 22 tons 4-inch cast-iron pipe and 128 tons

6-inch pipe, at \$35.40 per ton; 15 tons 10-inch, 25.8 tons 12-inch and 6.318 tons 14-inch pipe, at \$34.40 per ton; total, \$6,930.86; U. S. Cast Iron Pipe and Foundry Company, New York City, Charles Millar & Son Co., Utica, N. Y., Lynchburg Foundry Company, Lynchburg, Va., Warren Foundry and Machine Company, M. J. Drummond & Co., and Central Foundry Company, New York City, also submitted proposals.—W. Dabney Hunter, Engineer and Superintendent, Public Works.

Minneapolis, Minn.—Contracts have been signed with the U. S. Cast Iron Pipe and Foundry Company to furnish cast-iron pipe for the use of the Water Department during 1907 at \$37.10 per ton; the Camden Iron Works, Mathews fire hydrants, at \$41.75 each. The Worthington Foundry, special castings, at 3 cents per pound; William Brothers Boiler and Manufacturing Company, steel pipe, at \$6,500.—J. C. Haynes, Mayor; L. A. Lydiard, City Clerk.

Montevideo, Minn.—The Chicago Iron and Bridge Company has been awarded contract to construct steel tank and tower, 22 feet diameter and 28 feet high, for \$5,100; the Des Moines Bridge and Iron Company, the Minneapolis Steel and Machinery Company and W. D. Lovell also submitted proposals; Robinson & Cary were awarded contract for Rumsey pump, 531,360 gallons' capacity, at \$1,283.97, and Fairbanks, Morse & Co. for triplex motor, 30-horsepower, 200 head pressure to be pumped against, for \$314; other bidders on pump and motor were Deane Steam Pump Company, Geo. J. Cadwell & Co., Geo. J. Cach & Co., J. G. Robinson, Chicago Bridge and Iron Company, and W. D. Lovell.

St. Louis, Mo.—The following were the lowest bids received for erecting two schools. Shaw School: General work, Helm Building Company, \$151,842; plumbing, Philip C. Ring, \$8,304; heating, A. E. H. Abadie, \$20,498; electric work, Frank Adam Electric Company, \$6,145. Bids on two propositions for the Gardenville School were received, one being for the erection of an entire new building of ten rooms, another for the reconstruction of the present building, and an addition to it to make twelve rooms. The lowest bids on the proposition were, respectively: Helm Building Company, \$67,246; Hiram Lloyd Building and Construction Company, \$71,975.

Greenwood, Miss.—The contract to work the public roads of Greenwood district has been awarded to G. M. Turner for four years by the Board of Supervisors.

Hastings, Neb.—Contract for bridge work for Adams county for ensuing year has been let to Standard Bridge Company, of Omaha. **Albany, N. Y.**—Bids have been received for removing street dirt from Mulderry Bros., Albany, at \$12,400, or 78 cents per cubic yard, and from John C. Wasserbach, \$11,900, or 70 cents per cubic yard.—Isadore Wachsmann, Clerk Board of Contract and Supply; Walter E. Melius, City Engineer.

Buffalo, N. Y.—The German Rock Asphalt and Cement Company has been awarded contract for asphalt and repairing 66,415 square yards of streets and roads; the contract is for three years at 15 cents per square yard for first year, 17 cents for second year, and 18½ cents the third year, beginning July 1.—Thomas W. Kennedy, Deputy Street Commissioner.

Syracuse, N. Y.—Contract for constructing 15-inch pipe sewer in Green street has been let to Frank S. Sposato, at \$1,751; contract for 12-inch pipe sewer in Chester street was let to James Swift, at \$767.

Cincinnati, O.—The contract for paving Betts street from Central avenue to Freeman avenue with asphalt was awarded to the Kirchner Construction Company, Eighth and Plum streets, at \$19,578.

Lima, O.—Bids were opened, January 15, for furnishing and laying about 2,300 feet water conduit; the Stone Construction Company, Lima, was lowest bidder on steel pipe, at \$3 per lineal foot, and was awarded contract, total being \$6,200; Christ. Geiger, Lima, was lowest bidder on cast-iron pipe at \$9.59.—Edward King, Chief Engineer, Waterworks Department.

Toledo, O.—The Board of Public Service has awarded sewer contracts to William McMahon, as follows: Alley between Chase and Ontario streets, \$863.62; alley northwest of Wayne and in alley between Hanover and Somerset, \$1,715; alley between Moore and Yates, \$1,377; alley southeast of Albany street, \$745; alley between Noble and Yates, \$1,453. Contract for sewer in alley east of East Broadway and in Guard street, Freedom street, and alley north of Vinal street, was let to John McMahon, at \$13,348.

Pendleton, Ore.—Contract for steel bridges over the Umatilla River at Butter Creek and over Wild Horse Creek at Athens was let to Dion Keefe, Walla Walla, Wash., at \$2,456.

Harrisburg, Pa.—York Bridge Company, York, Pa., has been awarded contract by the State for constructing bridge over Susquehanna river at Mifflinville, for \$122,000.

Proposals

NEW YORK, January 28, 1907.

OFFICE OF THE COMMISSIONER OF STREET CLEANING.

TO CONTRACTORS

Interested in disposal of city wastes, and others.

Attention is called to the fact that at noon, Friday, February 25, 1907, bids will be opened by the Commissioner of Street Cleaning of The City of New York, at his office in the Park Row Building, for the contract for the final disposition of garbage and kindred refuse of the Borough of Brooklyn, for the period of five years, beginning September 1, 1907.

For further information see advertisement of the matter in the *City Record* and Brooklyn corporation newspapers, or apply at the office of the Commissioner of Street Cleaning.

M. CRAVEN.

Commissioner of Street Cleaning.

Water Pipe

Winnipeg, Man.

Sealed tenders addressed to the Chairman of the Fire, Water and Light Committee for the supply of 30 miles of assorted waterpipe and quantity of specials for the city waterworks will be received at the office of the undersigned up to 2.30 p. m. on Friday, March 1, 1907.

Specifications and forms of tender may be obtained at the office of H. N. Rutan, City Engineer, Winnipeg, Man.

Each tender must be accompanied by an accepted check or draft payable to the order of the City Treasurer, or cash deposit for the sum called for in the form of tender supplied, which will be subject to forfeiture in case of failure on the part of the contractor to enter into a written contract with approved sureties if called upon to do so.

The city reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the city of Winnipeg.

C. J. BROWN,

City Clerk.

City Clerk's Office, Winnipeg, December 8, 1906.

Fire Hydrants

Office, Commissioners, District of Columbia, Washington, D. C., January 17, 1907.—Sealed proposals will be received at this office until 12 o'clock, noon, March 2, 1907, for furnishing fire hydrants. Specifications, forms and necessary information may be obtained at room 43, District Building, Washington, D. C.

HENRY B. F. MacFARLAND,

HENRY L. WEST,

JOHN BIDDLE,

Commissioners, D. C.

THE almost World-wide tendency among the municipalities to go over to the wood-block in preference to the other pavements has been brought about by its record on the London and Paris foundations. We can sell you this foundation at one-half the London and Paris prices. Over twenty-five years ago the creosote wood paving-block fell into utter disrepute in America, on account of the American foundation. The Nash Road, Borough of Brooklyn, New York City, U. S. A.

WANTED—Energetic, able young man to act as superintendent of stone quarrying and cutting business. Must be thoroughly competent to figure plans and superintend cutting shed, and able to handle 200 or 300 men effectively. Reply should give previous experience in detail. Address "Quarries," care Municipal Journal and Engineer, Flatiron Building, New York.

MEN with machinery experience; accountants, stenographers, clerks, salesmen, managers, officials, etc., are in demand among firms we serve. Salaries, \$1,000-\$5,000. Write us to-day. Hapgoods, 305 Broadway, New York.

LEGAL NEWS

A Summary and Notes of Recent Decisions
—Rulings of Municipal Interest—

Water Works Franchise

Rogers Park Water Co. vs City of Chicago.—The company sought to obtain an injunction to restrain the city and its agents from erecting, maintaining or operating a system of waterworks in that portion of the city formerly embraced in the village of Rogers Park, where, before annexation, the Board of Trustees of the village passed an ordinance granting to the water company exclusive rights and privileges for thirty years, of erecting a system of waterworks. It was held that by granting an "exclusive" franchise it was not intended to forbid themselves to give a third party a similar right, or stop themselves from maintaining their own water supply.—Court of Appeals, Chicago, Ill.

Bill Boards Upheld

City of Passaic vs. Paterson Bill-Posting, Advertising and Sign Painting Co.—Where an ordinance requiring that signboards shall be constructed not less than ten feet from the street line, and that no sign or billboard shall be at any point more than eight feet above the surface of the ground, is held to be a regulation not reasonably necessary for the public safety, and not justified as an exercise of the police power.—District Court, Passaic, N. J.

Taxation of Water Rights

Hall vs. Assessors of Monroe.—Hall owns a factory in Tuxedo located on a stream which is the outlet of a pond situated in Monroe. The Monroe assessors levied a tax on the water rights and the case was decided in their favor in the Supreme Court. The decision of the court has been annulled by Justice Mooker, who holds that the water rights are incident to the property. To allow the rights to be taxed in the town, other than where the land itself is situated, might result in an anomalous situation. As in case the pond and the mill should be sold for taxes in each town, the two purchasers would find themselves at war in regard to the water rights.—Appellate Division Supreme Court, Suffern, N. Y.

Garbage Nuisance

Chapman vs. Chattanooga.—Chapman sued for \$10,000 damages, alleging that the sickness of his wife and the death of his child were due to dumping of garbage, including cats and dogs, in Tower and Weaver streets, which were being filled. It appeared that the cats and dogs were found on the street six months before the sickness; that one of the streets had never been used for dumping garbage, and that the other from which some offensive odors arose had not been filled at the time. The decision was against the plaintiff.—District Court, Chattanooga, Tenn.

Gas Option Valid

Citizens' Gas Co. vs. Indianapolis.—Judge Carter has overruled the demurrer of the city of Indianapolis, filed by City Attorney Matson, to the complaint of the Citizens' Gas Company, which asked for specific performance of the contract by which the city sold to the Citizens' Gas Company an op-

tion to buy the city's option on the plant of the Consumers' Gas Trust Company. Mayor Bookwalter considers the decision as final and the Citizens' Gas Company will be in a position to supply 60-cent gas, as they have planned.—Superior Court, Indianapolis, Ind.

NEWS OF THE SOCIETIES

Connecticut Society of Civil Engineers.

—The annual meeting of the Society will be held February 13 and 14, at Hartford. President Charles F. Chase, of New Britain, will preside at the meeting. Louis M. Haupt, Consulting Hydraulic Engineer, of Philadelphia, will address the meeting on the first day. New Haven engineers who will read papers before the sessions are: Charles Ferry, Henry Gladding, Curless Slocum, John Trumbull, Edward Everett, and Prof. John Tracy of Yale. Most all of the civil engineers of this city belong to the Connecticut association.

Connecticut Mayors' Association.—The meeting, January 24, was attended by Mayors and ex-Mayors from about a dozen cities in the State and the principal questions discussed were municipal lighting and Sunday closing. Mayor Forster of Rockville asked for the support of the other Mayors for a general lighting bill which would allow cities to take over the existing lighting plants at their actual valuation.

Illinois Society of Engineers and Surveyors.—The annual meeting was held at the National Hotel, Peoria, Ill., January 23-25. Owing to increase in membership of the society—it has doubled in five years—and the consequent improved financial conditions, improvements will be made in the publication of the transactions of the society. In his presidential address Mr. Dabney H. Maury of the Peoria Water Works Co. spoke of the progress in the design and manufacture of pumps. He stated that he believed centrifugal and turbine pumps would soon be made with efficiencies of over 80 per cent. John W. Alford, consulting engineer, described the water works and sewerage systems of Gary, Ind., which he is building. A. N. Johnson, chief engineer of the State Highway Commission, described the work under his charge in determining the traffic on public highways throughout the State. The reports are so far incomplete, but indicate clearly a rapid diffusion of traffic within two miles from towns and shipping centres. Mr. W. P. Blair, secretary of the National Association of Paving Brick Manufacturers, spoke on the inspection of brick and brick pavements. Prof. W. S. Parr, Department of Chemistry, University of Illinois, spoke on the fuel value of Illinois coal. Mr. H. Foster Bain of the State Geological Survey spoke of the work of that bureau. Among other papers presented were the following: "The Peoria & Bloomington Single-Phase Electric Ry.," by Mr. H. C. Hoagland; "Improvements in the Water Supplies of Marshfield and Waupaca, Wis.," by Mr. W. G. Kirchoffer; "Improved Streets with Heavy Grades," by Mr. C. G. Anderson; "The Illinois and Mississippi Canal," by Mr. F. W. Honens, and "Electric and Mule Haulage in Mines," by Mr. M. F. Peltier. The following officers were elected for the ensuing year: Messrs. C. B. Burdick, president; A. N. Johnson, vice-president; J. A. Moore and R. S. Wallace, trustees, and E. E. R. Tratman,

secretary. The next meeting will be held at the University of Illinois in Urbana.

Municipal League of North Dakota.—The members of the league met in the Council Chamber at Fargo, January 16. The principal subject of discussion was the municipal bill introduced in the State Senate by J. D. Taylor of Grand Forks. Proposed changes in the charter law were also discussed. Among those present were: Mayor Duis, City Attorney Rex and Aldermen Joy, Turner and Buckingham of Grand Forks, City Attorney Selby of Hillsboro, City Attorney H. N. Morphy of Wahpeton, City Attorney Knuckles of Mandan, City Attorney Pugh of Larimore, Mayor Johnson, City Attorney Resser, City Auditor Morgan, City Assessor Hall, Superintendent Craig of the Waterworks, City Engineer S. F. Crabbe and Aldermen Lewis, Amerland, Mills, Stewart, Marsh and Stern, all of Fargo.

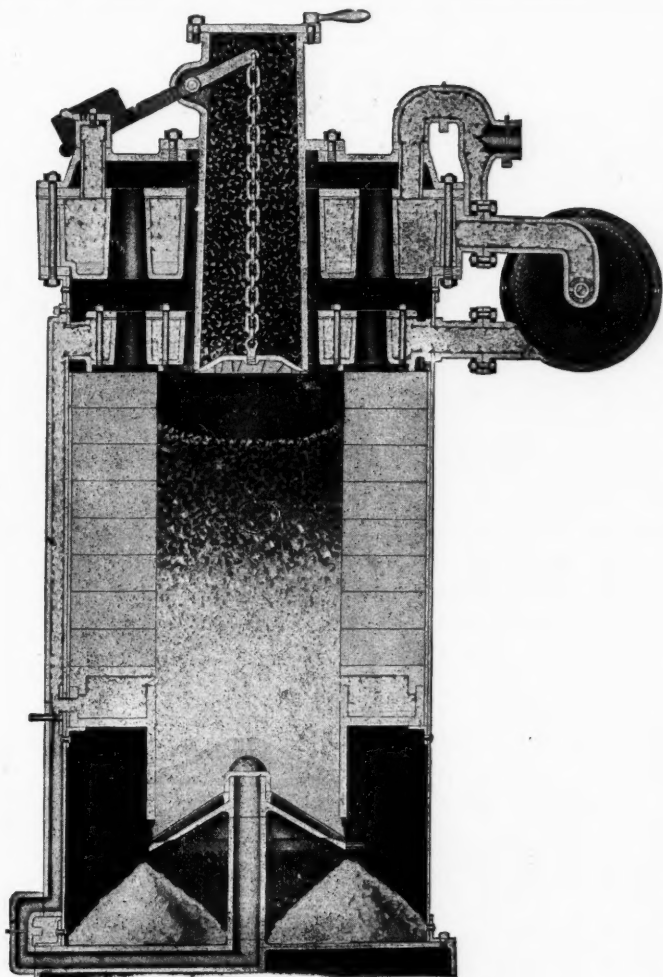
Ohio Engineering Society.—The meeting of the society began January 22, when the reports of the different committees were heard. That of the Committee on Legislation was read by C. A. Judson of Sandusky, that on Instruments and Exhibits by Professor F. H. Eno of Columbus, that on Hand Surveying and Drainage by J. W. Turner of Jackson, and that on the Pollution of Streams by Herman Stabler. Among the papers read during the meeting were: "Land Drainage," by J. H. Asher; "Northwest Transportation," by Charles G. Perkins; "Natural Development of Parks and Public Grounds," by Alex. C. Pharo Gage, Columbus, formerly of Stockholm, Sweden; "River Front Improvements," R. E. Kline, City Engineer, Dayton, O.; "Contracts and Contractors," by F. M. Kennedy, Washington C. H. The election was held on the 24th, when the following officers were elected: President, A. F. Cole, Marietta; Vice-President, William Wilson, Niles; Secretary and Treasurer, E. G. Bradbury, Columbus; Board of Trustees, F. E. Myers, Canton; J. H. Ashed, London; John Laylin, Norwalk; R. E. Kline, Dayton, and B. E. Trask, Granville.

Calendar of Meetings

- February 8.**
Illuminating Engineering Society.—Edison Auditorium, 44 West Twenty-sixth street, New York City.—Geo. H. Guy, Secretary, 109 Liberty street, New York City.
- February 13-14.**
Connecticut Society of Civil Engineers.—Annual convention, Hartford, Conn.—J. Frederick Jackson, Secretary, New Haven, Conn.
- February 15-16.**
Wisconsin Gas Association.—Annual meeting.—Henry H. Hyde, Secretary, Racine, Wis.
- February 22.**
New England Association of Gas Engineers.—Annual meeting, Boston, Mass.—N. W. Gifford, Secretary, New Bedford, Mass.
- February 26.**
Association of Ontario Land Surveyors.—Annual meeting, Toronto.—Killaly Gambel, Secretary, 405 Temple Building, Toronto, Ont.
- April 18-21.**
Southwestern Gas, Electric and Street Railway Association.—Annual meeting, San Antonio, Tex.—Frank C. Duffey, Secretary, Beaumont, Tex.
- May 28-30.**
American Society of Mechanical Engineers.—Spring meeting, Indianapolis, Ind.—Calvin W. Rice, Secretary, 12 West Twenty-first street, New York.
- June 1-4.**
American Anti-Tuberculosis League.—Annual convention, Atlantic City, N. J.—Dr. George Brown, Atlanta, Ga., President; Dr. Edward Guion, 1408 Atlantic avenue, Atlantic City, N. J., Vice-President.
- August 20-22.**
The International Association of Municipal Electricians.—Annual convention, Jamestown Exposition, Norfolk, Va.—F. P. Foster, Secretary, Corning, N. Y.

Trade Notes

SOME recent tests of the Cone Gas Machine, made by the Sargent Engineering Company of Chicago, Ill., have shown a degree of efficiency in heat value of gas produced exceeding by 50 per cent. the results obtained by the U. S. Government tests at the St. Louis Testing Station in 1905. In conducting the tests, thirty pounds of Pocahontas coal were put in the generator hopper and the engine was run until all the fuel in the generator was consumed or stopped giving off gas. As soon as the engine began to stop for want of gas the thirty pounds of coal were dumped in the producer, and the engine run until the thirty pounds of coal were consumed.



CONE GAS MACHINE

The following results were obtained:

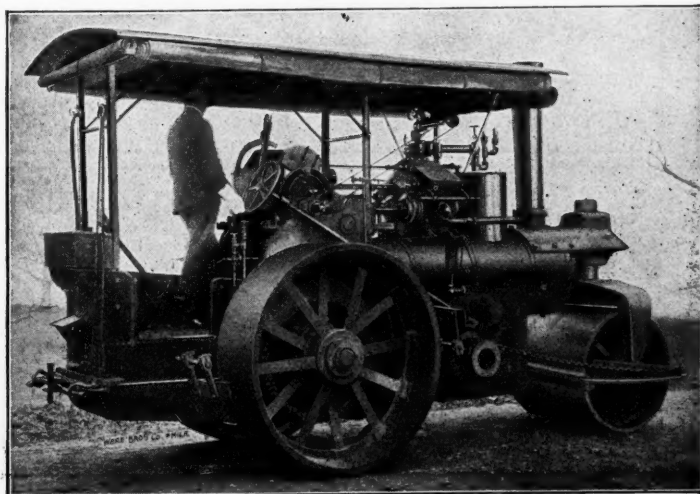
Pounds of coal per hour.....	11.38
Kilowatts per hour.....	9.621
Electric horsepower per hour.....	12.9
Efficiency of dynamo and belt assumed 2-3 load..	80%
Brake horsepower per hour.....	16.11
Pounds of coal per B. H. P. hour.....	.706

The reason for the efficiency of the Cone machine operated with soft coal is that the fuel bed is divided into two separate zones, the lower and primary zone being used to completely consume the fuel and prevent its action from being checked by the contrary action of steam. The steam is introduced into the upper zone only. The action is this: air is introduced below the primary bed, the fuel is kept at a high temperature, and the carbondioxide and other compounds formed enter the fuel in the secondary zone at a high degree of temperature, raise its temperature and drive off volatile hydro-carbons. Steam enters the generator just above the primary zone; it becomes decomposed, and the carbondioxide becomes carbonmonoxide.

GAS AND OIL ENGINES.—The Dubois Iron Works, Dubois, Pa., have taken over the entire business of the Lazier Engine Manufacturing Company, Buffalo, N. Y. The Dubois Iron Works have for years been manufacturing gas and gasoline engines, using the designs of Mr. Arthur A. Lazier, who now retires from the business. The engines will be manufactured under the name "Du Bois," and will include various improvements made possible by these arrangements. Mr. Peter Eyreman, who has had Continental experience in designing and manufacturing gas engines, will be chief of the engineering department. The company will continue to manufacture the Simplex Steam Pump.

ENLARGEMENT OF PLANT.—The Fort Wayne Electric Works have practically decided to make an extensive enlargement of the plant in Fort Wayne, Ind., and negotiations are now in progress for the purchase of a half square of very valuable property. In the spring a large modern building, four stories in height, will be erected, for making incandescent lamps. The company already has a large force at work in the factory in Montgomery street, where they employ 170 girls, and are turning out 14,000 lamps daily. By the time the new building is occupied the output will be tripled.

CONTRACTORS' MACHINERY.—The Advance Equipment Co., West End Trust Building, Philadelphia, Pa., issues a Monthly Bulletin in which descriptions are given of second-hand Hoisting Engines, Steam Road Rollers, Concrete Mixers, Dump Cars, Steam Shovels, Locomotives and other contractors' machinery. They will be glad to mail copies to those interested.



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PERSONALS

BRIDGES, J. A., Mayor of Mediapolis, Iowa, for many years, and publisher of the *Mediapolis News*, died recently.

BUNTON, NED, Chief of the Fire Department of Franklin, N. H., was recently presented with a handsome gold watch, chain and charm by members of the department, the presentation being made by Councilman H. F. Davis, of the Fire Department Committee. Chief Bunton recently planned to retire, but the City Council made his berth more lucrative by giving him the janitorship of the heating plant and opera house, carrying an additional salary of \$750 a year.

CORDELL, HENRY E., Architectural Engineer of the Building Department, of Chicago, Ill., has been appointed Deputy Commissioner, to succeed Andrew Hughes, who resumes his old position as Inspector.

JOHNSON, EDWARD J., has been elected City Engineer of Nashua, N. H.; Arthur L. Cyr, City Clerk; Jason E. Tolles, City Treasurer; Lowell G. Holt, Street Commissioner, and John Hagerty and Milton A. Taylor, members of the Board of Public Works.

LORD, SAMUEL J., has been unanimously elected by Council as City Engineer of Manchester, N. H.; Edward C. Smith, City Clerk; Fred L. Allen, Treasurer; George A. Wayne, City Solicitor; Edwin S. Foster, Building Inspector; Thomas W. Lane, Chief Engineer, Fire Department; Clarence R. Merrill, First Assistant Chief; John F. Seaward, Second Assistant; Thomas F. Fitzsimmons, Third Assistant, and Arthur Provost, Fourth Assistant Fire Chief.

MARCHMAN, M. T., was recently elected Mayor of Powder Springs, Ga., and Dr. W. E. Butner, John A. Lewis, G. M. Hardage, J. H. Kimberley, and C. H. Lindley, Councilmen.

MATTHEWS, DAVID A., Captain of Police of Worcester, Mass., has been named as Chief, to succeed the late William J. E. Stone. He was appointed to the police force in 1873, and was born in Boston 59 years ago.

SCHUNDT, HENRY L., of Hoboken, N. J., was re-elected President of the Board of Water Commissioners of the city, and Commissioner Edward Carroll, Secretary, at a meeting attended by Otto C. Luehs, the new member elected by the people, and Martin J. Whelan, ex-officio, as Chairman of the Council.

THOMPSON, WILLIAM B., recently relieved Mayor George P. Codd of the duties of chief executive of Detroit, Mich., and named as his Secretary, Ernest W. Kurtz.

TIEDEMAN, DR. GEORGE W., on January 20 succeeded Herman Myers as Mayor of Savannah, Ga., the latter having held the office ten years. Mayor Tiedeman was born in Charleston, but went to Savannah when a young man. He is proprietor of a wholesale grocery business, and ranks high in the Southern financial world, being President of the Georgia State Loan and Building Association, and Vice-President of the Germania Bank of Savannah.

TRANSACTS A GENERAL BANKING AND TRUST COMPANY BUSINESS

ROBERT S. BRADLEY, President
LANGLEY W. WIGGIN, Secretary
PARK TERRELL, Mgr. Bond Dept.

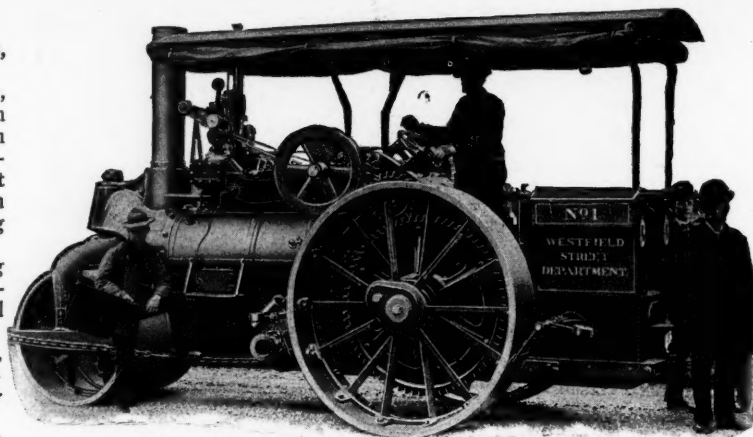
CLARK WILLIAMS, Vice-President
HOWARD BAYNE, Treasurer
DAVID S. MILLS, Trust Officer

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AND
SURPLUS
\$2,000,000.

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TRUST
COMPANY**

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NEW YORK

OFFERS A PRACTICAL METHOD FOR THE ISSUE OF
MUNICIPAL BONDS
AFFORDING ADEQUATE SAFEGUARDS AGAINST FORGERY AND
OVER-ISSUE, AND SERVING THE CONVENIENCE OF THE
ISSUING OFFICIALS. SEND FOR BOND PAMPHLET No. 6.
ACTS AS FISCAL AGENT FOR STATES AND MUNICIPALITIES.
INDEPENDENT OF THE CONTROL OF ANY SINGLE INTEREST.



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Used by the largest contractors all over the world. Strong, flexible construction, adapted for all kinds of stone road-building.

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Land Title Building, Philadelphia

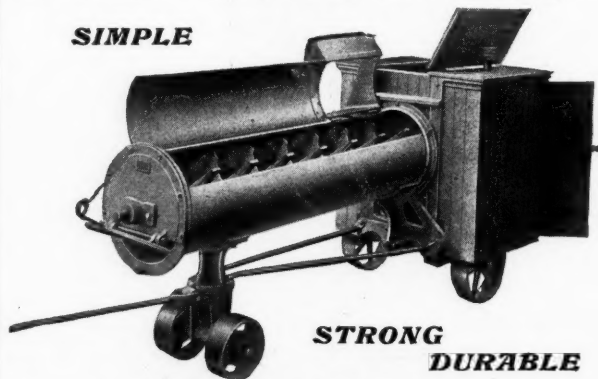
THE GRANT

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Guaranteed to keep 100 brick or stone masons busy. Makes the richest of mortar and tempered to the right consistency with 20 per cent. less lime.

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All Sizes for Every Possible Duty.

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